Determination of an Application for an Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2010

Decision document recording our decision-making process

The Permit Number is:	EPR/DP3132EY/A001
The Applicant / Operator is:	Dahlman Renewable Technology B. V.
The Installation is located at:	Grimsby Renewable Power Facility, Moody Lane, North East Lincolnshire, DN31 2SW

What this document is about

This is a decision document, which accompanies a permit.

It explains how we have considered the Applicant's Application, and why we have included the specific conditions in the permit we are issuing to the Applicant. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position. Unless the document explains otherwise, we have accepted the Applicant's proposals.

We try to explain our decision as accurately, comprehensively and plainly as possible. Achieving all three objectives is not always easy, and we would welcome any feedback as to how we might improve our decision documents in future. A lot of technical terms and acronyms are inevitable in a document of this nature: we provide a glossary of acronyms near the front of the document, for ease of reference.

Preliminary information and use of terms

We gave the application the reference number EPR/DP3132EY/A001. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we have given to the permit is EPR/DP3132EY. We refer to the permit as "the **Permit**" in this document.

The Application was duly made on 25/04/2014.

The Applicant is Dahlman Renewable Technology B.V. We refer to Dahlman Renewable Technology B.V. as "the **Applicant**" in this document. Where we are talking about what would happen after the Permit is granted we call Dahlman Renewable Technology B.V. "the **Operator**".

Dahlman Renewable Technology B.V's facility is located at Grimsby Renewable Power Facility, Moody Lane, North East Lincolnshire, DN31 2SW. We refer to this as "the **Installation**" in this document.

How this document is structured

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Glossary of acronyms used in this document

(Please note that this glossary is standard for our decision documents and therefore not all these acronyms are necessarily used in this document.)

APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous Emissions Monitor
CFB	Circulating Fluidised Bed
CFD	Computerised Fluid Dynamics
CHP	Combined Heat and Power
COMEAP	Committee on the Medical Effects of Air Pollutants
CROW	Countryside and Rights of Way Act 2000
CV	Calorific Value
DAA	Directly Associated Activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision Document
EAL	Environmental Assessment Level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission Limit Value
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2010 (SI 2010 No. 675) as amended
EQS	Environmental Quality Standard
EU-EQS	European Union Environmental Quality Standard
EWC	European Waste Catalogue
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HRSG	Heat Recovery Steam Generator
HMIP	Her Majesty's Inspectorate of Pollution
HPA	Health Protection Agency (now called Health Protection England)
HRA	Human Rights Act 1998
HWI	Hazardous Waste Incinerator

IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCPD	Large Combustion Plant Directive (2001/80/EC) – now superseded by IED
LCV	Lower Calorific Value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LOI	Loss on Ignition
MBT	Mechanical Biological Treatment
MSW	Municipal Solid Waste
MWI	Municipal Waste Incinerator
NOx	Oxides of Nitrogen (NO plus NO_2 expressed as NO_2)
OLGA	Oil and Gas cleaning system
Opra	Operator Performance Risk Appraisal
PAH	Polycyclic Aromatic Hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
POP(s)	Persistent Organic Pollutant(s)
PPS	Public Participation Statement
PR	Public Register
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RDF	Refuse Derived Fuel
RGS	Regulatory Guidance Series
SAC	Special Area of Conservation
SED	Solvent Emissions Directive (1999/13/EC) – now superseded by IED
SCR	Selective Catalytic Reduction
SGN	Sector Guidance Note
SNCR	Selective Non-catalytic Reduction
SPA(s)	Special Protection Area(s)

SS	Sewage Sludge
SSSI(s)	Site(s) of Special Scientific Interest
SWMA	Specified Waste Management Activity
TDI	Tolerable Daily Intake
TEF	Toxic Equivalent Factors
TGN	Technical Guidance Note
TOC	Total Organic Carbon
UHV	Upper Heating Value –also termed gross calorific value
UN_ECE	United Nations Environmental Commission for Europe
US EPA	United States Environmental Protection Agency
WFD	Waste Framework Directive (2008/98/EC)
WHO	World Health Organisation
WID	Waste Incineration Directive (2000/76/EC) – now superseded by IED

1 Our decision

We have decided to grant the Permit to the Applicant. This will allow it to operate the Installation, subject to the conditions in the Permit.

We consider that, in reaching that decision, we have taken into account all relevant considerations and legal requirements and that the permit will ensure that a high level of protection is provided for the environment and human health.

This Application is to operate an installation which is subject principally to the Industrial Emissions Directive (IED).

The Permit contains many conditions taken from our standard Environmental Permit template including the relevant Annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the permit, we have considered the Application and accepted the details are sufficient and satisfactory to make the standard condition appropriate. This document does, however, provide an explanation of our use of "tailor-made" or installation-specific conditions, or where our Permit template provides two or more options.

2 How we reached our decision

2.1 Receipt of Application

The Application was duly made on 25/04/2014. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

The Applicant made no claim for commercial confidentiality. We have not received any information in relation to the Application that appears to be confidential in relation to any party.

2.2 Consultation on the Application

We carried out consultation on the Application in accordance with the EPR, our statutory PPS and our own RGS Note 6 for Determinations involving Sites of High Public Interest. We consider that this process satisfies, and frequently goes beyond the requirements of the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, which are directly incorporated into the IED, which applies to the Installation and the Application. We have also taken into account our obligations under the Local Democracy, Economic Development and Construction Act 2009 (particularly Section 23). This requires us, where

we consider it appropriate, to take such steps as we consider appropriate to secure the involvement of representatives of interested persons in the exercise of our functions, by providing them with information, consulting them or involving them in any other way. In this case, our consultation already satisfies the Act's requirements.

We advertised the Application by a notice placed on our website, which contained all the information required by the IED, including telling people where and when they could see a copy of the Application.

We placed a copy of the Application and all other documents relevant to our determination (see below) on our Public Register. Anyone wishing to see these documents could do so and arrange for copies to be made.

We sent copies of the Application to the following bodies, which includes those with whom we have "Working Together Agreements":

- Local Authority – North East Lincolnshire, Planning and Environmental Health
- Sewage Undertaker – Anglian Water services
- Humber Harbour Authority
- Humber Port Authority
- Local Fisheries - North East - Inshore Fisheries Conservation Authority
- Food Standards Agency -FSA
- Health and Safety Executive - HSE
- Public Health England – North East Lincolnshire
- Director of Public Health
- Local Fire Service – Humberside Fire and rescue service
- National Grid
- Natural England

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly. Note under our Working Together Agreement with Natural England, we only inform Natural England of the results of our assessment of the impact of the installation on designated Habitats sites.

In addition to the above, the operator held a public meeting which was attended initially by the local MP and elected members, radio and printed press. There was then an open session for members of the public. This resulted in a very low attendance and the agency received no enquires after the event.

Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 4. We have taken all relevant representations into consideration in reaching our determination.

2.3 Requests for Further Information

After receiving further information we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued requests for further information. A copy of each RFI and Schedule 5 notice was placed on our public register, as was the response when received.

3 The legal framework

The Permit will be granted under Regulation 13 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an *installation* and a *waste incineration plant* as described by the IED;
- an *operation* covered by the WFD, and
- subject to aspects of other relevant legislation which also have to be addressed.

We address some of the major legal requirements directly where relevant in the body of this document. Other requirements are covered in a section towards the end of this document.

We consider that, in granting the Permit, it will ensure that the operation of the Installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

The Installation is subject to the EPR because it carries out an activity listed in Part 1 of Schedule 1 to the EPR:

- Section 5.1 Part A(1)(b) The incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 3 tonnes per hour.

The IED definition of “waste incineration plants” and “waste co-incineration plants” says that it includes:

> *“all incineration lines or co-incineration lines, waste reception, storage, on site pre-treatment facilities, waste, fuel and air*

supply systems, boilers, facilities for the treatment of waste gases, on-site facilities for treatment or storage of residues and waste water, stacks, devices and systems for controlling incineration or co-incineration operations, recording and monitoring incineration or co-incineration conditions."

Many activities which would normally be categorised as "directly associated activities" for EPR purposes, such as air pollution control plant, and the ash storage bunker, are therefore included in the listed activity description.

An installation may also comprise "directly associated activities", which at this installation includes the generation of electricity using a gas turbine, a Heat Recovery Steam Generator, a steam turbine, nitrogen production plant, water treatment plant, back up electricity generator and a fire pump for emergencies. These activities comprise one installation, because the incineration plant and the above plant are successive steps in an integrated activity.

Together, these listed and directly associated activities comprise the Installation.

4.1.2 The Site

Grimsby Renewable Power Facility is located at the former Huntsman Tioxide site, south of the River Humber at grid reference TA 25420 11380. It is on Moody Lane, situated to the north west of the centre of Grimsby. The immediate area is surrounded by industrial units. Approximately 350 m north of the site is the Humber Estuary, which is designated as:

- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Ramsar
- Site of Special Scientific Interest (SSSI)

There are also 14 Local Wildlife sites within 2 km.

The Applicant has submitted appropriate documents to allow the Environment Agency to assess the likely impacts on the above sites as part of the determination process.

The Applicant submitted a plan which we consider is satisfactory, showing the site of the Installation and its extent. A plan is included in Schedule 7 to the Permit, and the Operator is required to carry on the permitted activities within the site boundary.

Further information on the site is addressed below at 4.3.

4.1.3 What the Installation does

The Applicant has described the facility as Energy from Waste. Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the installation is a waste incineration plant because:

Notwithstanding the fact that waste will be thermally treated by the process; the process is nevertheless 'incineration. It is considered that although the main purpose of this plant is the generation of energy, the waste being burnt does not undergo any significant pre-treatment to enhance its performance as a fuel.

Although the process used to thermally treat the waste is indirect gasification; for the process not to be considered to be a waste incineration plant, the resultant gases from the gasification process must be purified to such an extent that they are no longer a waste prior to their combustion and can cause emissions no higher than those from the burning of natural gas. The Applicant has not demonstrated to our satisfaction that the gases have passed the 'end of waste' test as referred to in the Waste Framework Directive; therefore the whole process is considered to be a waste incineration plant and therefore subject to the requirements of Chapter IV of the IED.

The purpose of the site is to generate electricity which will be fed into the national grid. The electricity will be produced using waste derived fuels as a fuel for the gasification process.

The expected throughput of the facility is 53,600 tonnes per annum. The total waste derived fuel to be stored on site at any one time will be 1,395 tonnes. The energy within this fuel will be used to generate 5.7 MW of electricity via the gas turbine and 3.1 MW of electricity via the steam turbine. After deduction of the plants parasitic load (1.8 MW), 7 MW net electricity will be distributed to the national grid.

All fuel will arrive on site from an existing Materials Recovery Facility (MRF) having been pre-treated and quality controlled to the operators specifications (the operator has the ability to resize any waste that is outside of the desired specification).

The facility consists of the following main processes:-

Solid fuel receipt and temporary storage

Fuel bales will be delivered to the site in lorries, discharged via an automated offloading system and then segregated in specifically allocated areas. Clean wood biomass used for start-up processes will be unloaded automatically and stored separately in a silo with a capacity for 5 days operation.

Fuel feeding system to the MILENA Gasifier

Transport of fuel will be via conveyor to a feed collector/mixer. When correctly mixed it is transported from the mixer to one of four dosing bunkers. The bunkers are 44 m^3 with two being dedicated to wood and two for waste derived fuel. Having four bunkers allows for two bunkers to be out of action and the plant still able to run at 100% capacity. A dosing storage bunker of 44m^3 corresponds with approximately 60 minutes feed. From the dosing bunkers the fuel is transported by rotary valves and two (pressure equalization) valves to a weighing screw conveyor to maintain pressure control and avoid gas leakages at the fuel input.

MILENA Gasifier

The conversion of fuel into syngas is similar to a conventional Circulating Fluidised Bed (CFB) gasifier; therefore 90-95% carbon conversion is achieved within the pyrolysis zone. However, unlike conventional gasifiers the remaining 5-10% carbon, together with ash and bed material is sent to the combustion section directly via the internal downcomer.

Ash and tar captured by the cyclones as part of the cleaning of the product gas in the OLGA system are also sent to the combustion section of the MILENA. In this combustion section the char and tars are fully combusted. As such, the overall carbon conversion is stated by the operator to be 100% and both fly ash from the combustion section, as well as bottom ashes from the gasification section are carbon free and non-pyrophoric.

This is a patented design utilising a hot bed of sand or olivine (a natural mineral rock) at, typically, 925°C to breakdown the fuel to produce gas in an indirect process operating on the principle of internal CFB. Olivine/sand is continually replenished into the process.

Auxiliary gas burners will be installed to ensure the temperature does not fall below 850°C and this will be controlled by the system automation. Residence time for the CFB combustor is at least 2 seconds.

Tar removal based on OLGA technology (Oil and Gas Cleaning)

The syngas is cleaned to remove oils and tars and utilised in a turbine in compliance with the Industrial Emissions Directive.

This is a patented design using a propriety oil scrubber to remove the tar and residual dust from the gas stream. The system comprises two scrubbers; one which removes the light tar, and a secondary column to remove the heavy tars. The tars collected are separated from the oil and recycled to the gasifier. Both oil and tar can be temporarily stored in tanks if necessary for example during maintenance work on the system. Oil will be stored on site within four tanks as follows:

Fresh Heavy Oil	5 m3
Used Heavy Oil	10 m3
Fresh Light Oil	5 m3
Used light Oil	10 m3

- Water Condensing Scrubber – provides water removal, from 30-35% moisture in the product gas after cleaning in the OLGA system to approximately 6% upstream of the compressor of the power island. Further water removal will take place in this multistage compressor upstream of the turbine. This initial water condensation will result in partial removal of:

- HCl from fuel bound chlorine
- NH_3 and other nitrogenous components from fuel bound nitrogen
- Metal from fuel bound metals

- Acid Water Scrubber - Further removal of inorganics take place in an acid water scrubber, particularly designed for removing more NH_3 by means of chemical reaction into soluble salt in addition to the amount already removed by NH_3 dissolving in the condensed water.

Flue gas cleaning gasifier

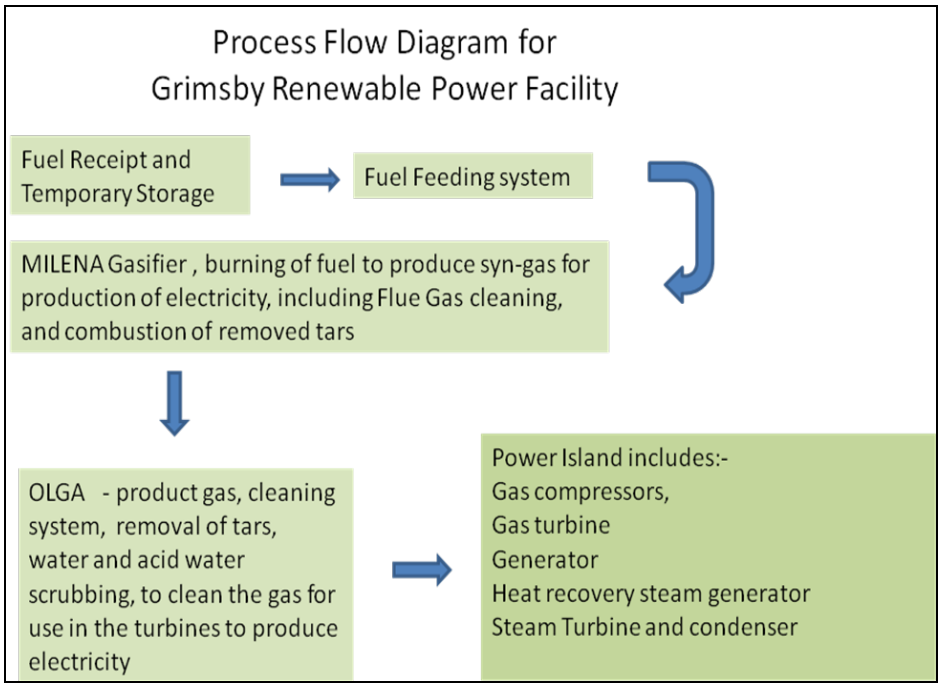
The flue gases from the gasifier will first be cooled and then pass through a bag filter. The solids are then taken from this filter via a screw conveyor to be contained in a storage hopper for offsite removal by a licensed waste disposal company.

Power Island

– After OLGA cleaning and water removal the gas is then passed to a package power generation unit comprising of:

- Gas compressors
- Gas turbine (Solar Taurus-60)
- Generator
- Heat recovery steam generator (HRSG)
- Steam Turbine and condenser

The following flow diagram shows the simplified process taking place within the installation.



The key features of the Installation can be summarised in the table below.

Waste throughput, Tonnes/line	53,600 tonnes/annum	7.66 tonnes/hour (based on 7000 hr/yr)
Waste processed	Clean wood (non-waste), Refuse Derived Fuel (RDF)	
Number of lines	1	
Furnace technology	Gasification	
Auxiliary Fuel	Natural Gas	
Particulate Control	MILENA flue gas	Bag filter with lime dosing and wet scrubber
	MILENA product gas passed through the OLGA	Cyclones, oil scrubber and electrostatic precipitators
Acid gas abatement	Dry and wet (flue gas)	Hydrated lime, activated carbon and water
	Wet and dry (product gas)	Caustic and hydrated lime
NO_x abatement	Secondary air (flue gas)	
	Wet and SCR (product gas)	Sulphuric acid and ammonia
Reagent consumption	Auxiliary Fuel: 85 te/annum Ammonia : 250 te/annum Hydrated lime: 40 te/annum Activated carbon: 4.5 te/annum Sulphuric Acid (98%): 265 te/annum Caustic (33%): 1,900 te/annum Process water: 3,900 te/annum	
Flue gas recirculation	None. (For NO_x abatement secondary air will be	

	used.)			
Dioxin abatement	No activated carbon injection is necessary for dioxins as emissions are expected to be well below the emission standards.			
Stack 1 (MILENA)	Height: 50 m	Diameter: 0.6 m	Flow: 3.8 Nm^3/s	Velocity: 16.1 m/s
Stack 2 (Post -turbine by pass stack limited to 500hrs/year)	Height: 20 m	Diameter: 2.4 m	Flow: 9.3 Nm^3/s	Velocity: 9.8 m/s
Stack 3 (Post-turbine)	Height: 50 m	Diameter: 1.3 m	Flow: 9.3 Nm^3/s	Velocity: 21.2 m/s
Flare 1 (raw syn gas post cyclone)	Height: 30 m	Diameter: 2.0 m	Flow: 11.5 Nm^3/s	Velocity: 5.54 m/s
Flare 2	Height: 30 m	Diameter: 3.0 m	Flow: 11.5 Nm^3/s	Velocity: 5.54 m/s
Flare 3 (post OLGA, compressed product gas, pre turbine)	Height: 5 m	Diameter: 1.0 m	Flow: 16.0 Nm^3/s	Velocity: 21.91 m/s
Electricity generated	8.8 MWe		61,600 MWh	
Electricity exported	7 MWe		49,000 MWh	
Steam conditions	Temperature: 430°C		Pressure: 39 bar/MPa	
Waste heat use	The operator has identified 3.5 MW of usable heat above 90^oC, however there are currently no opportunities for use.			

4.1.4 Key Issues in the Determination

The key issues arising during this determination were the close proximity of the Humber Estuary and Local wildlife sites, and the possible effects of air emissions from the proposed installation. We therefore describe how we determined these issues in most detail in this document.

4.2 The site and its protection

4.2.1 Site setting, layout and history

Grimsby Renewable Power Facility is located at the former Huntsman Tioxide site at grid reference TA 25420 11380 on Moody Lane, situated to the north west of the centre of Grimsby. To the north of the site by approximately 350m is the Humber Estuary which is designated as a SAC, SPA, Ramsar and SSSI. There are also 14 Local Wildlife sites within 2km.

The former Huntsman Tioxide site was used or the production of Titanium Dioxide. Anecdotal evidence suggest there may be minor radioactive contamination near the railway siding where raw materials were loaded and unloaded. The Environment Agency are also aware of areas within the site boundary which may have naturally occurring radioactive material. A letter was sent to Dahlman via Wiser consultants informing them of the above and the possible need for a permit if buried contamination is excavated and accumulated on site for disposal.

In 1888 the land appears to have been used for agricultural purposes. To the east of the site is a Rifle Range and to the south east are Railway Lines. By 1906 some further industrialisation occurred in the form of Pyewipe Brick and Tile Works and also West Marsh Paper Mills to the south east of the site and further railway development. The area continued to develop and in 1956 there was the development of a large chemical works to the east of the site boundary. By 1981 the entire site had been developed as part of the chemical works, along with new roads and other industrial development. By 2012 the railway and related sidings had been removed.

RWE nPower co-gen own a CHP plant which originally served the Huntsman Tioxide site until it closed in 2009. RWE CHP plant has been kept as a short term operating reserve (STOR). ESI Ltd produced a report in July 2009 making reference to ground investigations for RWE. Elevated concentrations of Total Petroleum Hydrocarbons (TPH), up to 21,500mg/kg were encountered during these investigations, as well as elevated sulphate and PAH concentrations but no gross contamination was evident.

As parts of the site have been used since 2009, the above results may no longer be indicative of the site condition. We are satisfied that RWE are currently addressing the above issues and Royal Dahlman will be carrying out a baseline report in line with PO7.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

Article 22(2) of the IED the Applicant is required to provide a baseline report containing at least the information set out in paragraphs (a) and (b) of the Article before starting operation.

The Applicant has not submitted a baseline report. We have therefore set a pre-operational condition (PO7) requiring the Operator to provide this information prior to the commencement of operations.

The baseline report is an important reference document in the assessment of contamination that might arise during the operational lifetime of the installation and at cessation of activities at the installation

4.2.3 Closure and decommissioning

Having considered the information submitted in the Application, we are satisfied that the appropriate measures will be in place for the closure and decommissioning of the Installation, as referred to in Site Condition Report K179.1-11-002 Final 03 March 2014 submitted in the Application. Pre-operational condition PO1 requires the Operator to have an Environmental Management System in place before the Installation is operational, and this will include a site closure plan.

At the definitive cessation of activities, the Operator has to satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or groundwaters, taking into account both the baseline conditions and the site's current or approved future use. To do this, the Operator has to apply to us for surrender, which we will not grant unless and until we are satisfied that these requirements have been met.

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation.

We are satisfied that the Applicant is the person who will have control over the operation of the Installation after the granting of the Permit; and that the Applicant will be able to operate the Installation so as to comply with the conditions included in the Permit.

The incineration of waste is not a specified waste management activity (SWMA). The Environment Agency has considered whether any of the other activities taking place at the Installation are SWMAs and is satisfied that none are taking place.

We are satisfied that the Applicant's submitted Opra profile is accurate.

The Opra score will be used as the basis for subsistence and other charging, in accordance with our Charging Scheme. Opra is the Environment Agency's method of ensuring application and subsistence fees are appropriate and proportionate for the level of regulation required.

4.3.2 Management

The Applicant has stated in the Application that they will implement an Environmental Management System (EMS) that will be certified under ISO14001 or EMAS.

The operator will operate the site using ISO14001, incorporating staff competence training, management and operational procedures including an accident management plan and incident response. All facilities will be new and constructed in accordance with BAT requirements. All oil storage facilities will meet the requirements of the Control of Pollution (Oil Storage) (England) Regulations 2001. Surface (rain) water will be discharged to the adjacent water course via a full retention interceptor. The site will be designed with the provision of containment on oil columns, tanks and circulation skids. There will be interceptors on site drainage systems, and regular maintenance checks performed. There will be no direct discharges to ground water at the site. Process waters will be re-circulated where applicable, or discharged to sewer in line with the discharge consent.

A pre-operational condition (PO1) is included requiring the Operator to provide a summary of the EMS prior to commissioning of the plant and to make available for inspection all EMS documentation. The Environment Agency recognises that certification of the EMS cannot take place until the Installation is operational. An improvement condition (IC1) is included requiring the Operator to report progress towards gaining accreditation of its EMS.

We are satisfied that appropriate management systems and management structures will be in place for this Installation, and that sufficient resources are available to the Operator to ensure compliance with all the Permit conditions.

4.3.3 Site security

Having considered the information submitted in the Application, we are satisfied that appropriate infrastructure and procedures will be in place to ensure that the site remains secure.

4.3.4 Accident management

The Applicant has not submitted an Accident Management Plan. However, having considered other information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are prevented but that, if they should occur, their

consequences are minimised. An Accident Management Plan will form part of the Environmental Management System and must be in place prior to commissioning as required by a pre-operational condition (PO1).

4.3.5 Off-site conditions

We do not consider that any off-site conditions are necessary.

4.3.6 Operating techniques

We have specified that the Applicant must operate the Installation in accordance with the following documents contained in the Application:

Description	Parts Included	Justification
Application	Responses to Part B and Appendix 6 of the application form and referenced supporting documents. Responses to RFI received 18/02/14, 21/03/14 and 16/04/14in support of the application.	Duly Made 25/04/14
Response to Schedule 5 Notice dated 08/07/2014	Responses to questions 1, 4, 5, 7, 10, and 13.	31/07/14
Questions via email re operation of stacks and flares 08/07/2014	Further response, re description of stack and flares. Further clarification of operation of stacks and flares	11/08/14 22/08/14
Response to Schedule 5 Notice dated 20/08/2014	Response to questions 1, 2, 3, 4 and	01/09/14
Request via email for new site boundary plan	New site boundary plan showing main emission points and boundary	08/10/14
Email15/10/14	Clarification of list of waste codes	15/10/14
Email 15/10/14	Final list of waste codes	15/10/14 (10.52)
Request via email 25/11/14	Request for derogation for gas turbine and periodic monitoring of HF	Emails dated 03/12/14 & 05/12/14

The details set out above describe the techniques that will be used for the operation of the Installation that have been assessed by the Environment Agency as BAT; they form part of the Permit through Permit condition 2.3.1 and Table S1.2 in the Permit Schedules.

Article 45(1) of the IED requires that the Permit must include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2005/532/EC, EC, if possible, and containing information on the quantity of each type of waste, where appropriate. The Application contains a list of those wastes coded by the European Waste Catalogue (EWC) number, which the Applicant will accept in the waste streams entering the plant and which the plant is capable of burning in an environmentally acceptable way. We have specified the permitted

waste types, descriptions and, where appropriate, quantities which can be accepted at the installation in Table S2.2.

We are satisfied that the Applicant can accept the wastes contained in Table S2.2 of the Permit because: -

(i) the wastes are all categorised as non-hazardous in the European Waste Catalogue and are capable of being safely burnt at the installation.
(ii) these wastes are likely to be within the design calorific value (CV) range for the plant;
(iii) these wastes are unlikely to contain harmful components that cannot be safely processed at the Installation.

We have limited the capacity of the Installation to 53,600 tonnes per annum. This is based on the installation operating 7000 hours per year at a nominal capacity of 7.66 tonnes per hour. This is anticipating a 79% availability with 21% for outages and planned maintenance. It should be noted that this a demonstration plant, hence reduced operational time.

We have further restricted the operation of the plant by limiting the throughput of wastes – no wastes shall be burned during start up, only clean wood biomass.

The Installation will be designed, constructed and operated using BAT for the incineration of the permitted wastes. We are satisfied that the operating and abatement techniques are BAT for incinerating these types of waste. Our assessment of BAT is set out later in this document.

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

We have considered the issue of energy efficiency in the following ways:

1. The use of energy within, and generated by, the Installation which are normal aspects of all EPR permit determinations. This issue is dealt with in this section.

2. The extent to which the Installation meets the requirements of Article 50(5) of the IED, which requires *"the heat generated during the incineration and co-incineration process is recovered as far as practicable through the generation of heat, steam or power*". This issue is covered in this section.

3. The combustion efficiency and energy utilisation of different design options for the Installation are relevant considerations in the determination of BAT for the Installation, including the Global Warming Potential of the different options. This aspect is covered in the BAT assessment in section 6 of this Decision Document.

(ii) Use of energy within the Installation

Having considered the information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that energy is used efficiently within the Installation.

The Application details a number of measures that will be implemented at the Installation in order to increase its energy efficiency. The operator intends to commit to an energy efficiency continuous improvement programme as part of its environmental management system. The system will include monitoring of energy consumption and setting performance targets with regular reviews to ensure compliance. Operational procedures will be in place to ensure the plant is operated efficiently, particularly at start up and shutdown.

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 240kWh/tonne. The installation capacity is 53,600t/a.

Data from the BREF for Municipal Waste Incinerators shows that the range of specific energy consumptions is as in the table below.

MSWI plant size range (t/yr)	**Process energy demand (kWh/t waste input)**
Up to 150,000	300 – 700
150,000 – 250,000	150 – 500
More than 250,000	60 – 200

The BREF says that it is BAT to reduce the average installation electrical demand to generally below 150 kWh/tonne of waste with an LCV of 10.4 MJ/kg. The LCV in this case is expected to be 21.5 MJ/kg. Taking account of the difference in LCV, the specific energy consumption in the Application is in line with that set out above.

(iii) Generation of energy within the Installation - Compliance with Article 50(5) of the IED

Article 50(5) of the IED requires that *"the heat generated during the incineration and co-incineration process is recovered as far as practicable*".

Our draft CHP Ready Guidance (Dec 2012) considers that BAT for energy efficiency for Energy from Waste (EfW) plant is the use of CHP in circumstances where there are technically and economically viable opportunities for the supply of heat from the outset.

The term CHP in this context represents a plant which also provides a supply of heat from the electrical power generation process to either a district heating network or to an industrial / commercial building or process. However, it is recognised that opportunities for the supply of heat do not always exist from the outset (i.e. when a plant is first consented, constructed and commissioned).

In cases where there are no immediate opportunities for the supply of heat from the outset, the Environment Agency considers that BAT is to build the plant to be CHP Ready (CHP-R) to a degree which is dictated by the likely future opportunities which are technically viable and which may, in time, also become economically viable.

The BREF says that where a plant generates electricity only, it is BAT to recover 0.4 – 0.65 MWh/ tonne of waste (based on LCV of 10.4 MJ/kg). Our technical guidance note, SGN EPR S5.01, states that where electricity only is generated, 5-9 MW of electricity should be recoverable per 100,000 tonnes/annum of waste (which equates to 0.4 – 0.72 MWh/tonne of waste).

The Installation will generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. The Sankey diagram in the Energy Efficiency Assessment of the Application shows 8.8MW of electricity produced for an annual burn of 53,600 tonnes, which represents 16.4MW per 100,000 tonnes/yr of waste burned (7.66MWh/tonne of waste). The Installation is therefore more efficient than the indicative BAT range.

The SGN and Chapter IV of the IED both require that, as well as maximising the primary use of heat to generate electricity; waste heat should be recovered as far as practicable.

The Grimsby facility is located at the site of the former Huntsman Tioxide Plant. This area is in the process of being demolished and therefore currently there are no industrial or residential demands for excess heat. Approaches have been made to nearby industry however they do not require high grade heat and arrangements are already in place for low grade heat for space heating and water heating. Despite this, efforts are continuing to find a user for any unused heat. The company has identified 3.5MW reusable heat which could be available for use, and the plant is being designed to enable retrofitting of the necessary equipment.

Our draft CHP guidance also states that opportunities to maximise the potential for heat recovery should be considered at the early planning stage, when sites are being identified for incineration facilities. In our role as a statutory consultee on the planning application, we ensured that the issue of energy utilisation was brought to the planning authority's attention

We consider that, within the constraints of the location of the Installation explained above, the Installation will recover heat as far as practicable, and therefore that the requirements of Article 50(5) are met.

(iv) R1 Calculation

The R1 calculation does not form part of the matters relevant to our determination. It is however a general indicator that the installation is achieving a high level of energy recovery.

The Applicant has not presented an R1 calculation with this application, nor have we received a separate application for a determination on whether the installation is a recovery or disposal facility.

Note that the availability or non-availability of financial incentives for renewable energy such as the ROC and RHI schemes is not a consideration in determining this application.

(v) Choice of Steam Turbine

As a new development the proposed installation will be designed for the highest practical energy efficiency. Electricity will be generated via two turbines and a gas turbine (Tarus-60). This turbine's heat is transferred to steam in a HRSG. The HRSG is a heat exchanger that produces superheated steam from the gas turbine. The Milena flue gas heat is also used for steam production by the HRSG, and produces similar quality steam; both steam flows are combined to produce electricity. Both turbines on site contribute to the 8.8MW produced; 5.7MW in the gas turbine and 3.1MW in the steam turbine. This is 7MW net electricity after taking into account the 1.8MW parasitic load.

(vi) Choice of Cooling System

The Applicant looked at various cooling systems: closed cooling water system, cooling water and air-coolers and cooling water from an external source.

The closed cooling water system tends to be used for larger cooling capacity requirements, and with respect to an external source of water, this would likely be the Humber Estuary, providing estuarine water which would lead to complications and further problems when returning the heated water to the estuary.

As the cooling water is mainly required for the steam condenser which is linked to the steam turbine part of the combined cycle gas turbine, the Applicant has selected a cooling water system that is based on utilising one or two water circuits with associated air-coolers to cool the circulating water.

The above system is regularly used where the amount of cooling capacity is comparatively small (10-12MW) and this technology is well proven. We are therefore satisfied that this system represents BAT for this installation.

(vii) Permit conditions concerning energy efficiency

Pre-operational condition PO2 requires the Operator to carry out a comprehensive review of the available heat recovery options prior to

commissioning, in order to ensure that waste heat from the plant is recovered as far as possible.

Conditions 1.2.2 and 1.2.3 have also been included in the Permit, which require the Operator to review the options available for heat recovery on an ongoing basis, and to provide and maintain the proposed steam/hot water pass-outs.

The Operator is required to report energy usage and energy generated under condition 4.2 and Schedule 4. The following parameters are required to be reported: total electrical energy generated; electrical energy exported; total energy usage and energy exported as heat (if any). Together with the total MSW burned per year, this will enable the Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency is less than proposed.

There are no site-specific considerations that require the imposition of standards beyond indicative BAT, and so the Environment Agency accepts that the Applicant's proposals represent BAT for this Installation.

4.3.8 Efficient use of raw materials

Having considered the information submitted in the Application, we are satisfied that the appropriate measures will be in place to ensure the efficient use of raw materials and water.

The Operator is required to report with respect to raw material usage under condition 4.2 and Schedule 4, including consumption of lime, activated carbon and ammonia used per tonne of waste burned. This will enable the Environment Agency to assess whether there have been any changes in the efficiency of the air pollution control plant, and the operation of the SCR to abate NO_x. These are the most significant raw materials that will be used at the Installation, other than the waste feed itself (addressed elsewhere). The efficiency of the use of auxiliary fuel will be tracked separately as part of the energy reporting requirement under condition 4.2.1. Optimising reagent dosage for air abatement systems and minimising the use of auxiliary fuels is further considered in the section on BAT.

4.3.9 Avoidance, recovery or disposal with minimal environmental impact of wastes produced by the activities

This requirement addresses wastes produced at the Installation and does not apply to the waste being treated there. The principal waste streams the Installation will produce are bottom ash, air pollution control residues, recovered metals and waste liquor.

The first objective is to avoid producing waste at all. Waste production will be avoided by achieving a high degree of burnout of the ash in the furnace, which results in a material that is both reduced in volume and in chemical

reactivity. Condition 3.1.3 and associated Table S3.5 specify limits for total organic carbon (TOC) of <3% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

Incinerator bottom ash (IBA) will normally be classified as non-hazardous waste. However, IBA is classified on the European List of Wastes as a "mirror entry", which means IBA is a hazardous waste if it possesses a hazardous property relating to the content of dangerous substances. Monitoring of incinerator ash will be carried out in accordance with the requirements of Article 53(3) of IED. Classification of IBA for its subsequent use or disposal is controlled by other legislation and so is not duplicated within the permit.

Air pollution control (APC) residues from flue gas treatment are hazardous waste and therefore must be sent for disposal to a landfill site permitted to accept hazardous waste, or to an appropriately permitted facility for hazardous waste treatment. The amount of APC residues is minimised through optimising the performance of the air emissions abatement plant.

In order to ensure that the IBA and APC residues are adequately characterised, pre-operational condition PO3 requires the Operator to provide a written plan for approval detailing the ash sampling protocols. Table S3.5 requires the Operator to carry out an ongoing programme of monitoring.

The Application also proposes that, where possible, bottom ash will be transported to a suitable recycling facility, from where it could be re-used in the construction industry as an aggregate. The Applicant is currently investigating options for the use of bottom ash in road construction.

Having considered the information submitted in the Application, we are satisfied that the waste hierarchy referred to in Article 4 of the WFD will be applied to the generation of waste and that any waste generated will be treated in accordance with this Article.

We are satisfied that waste from the Installation that cannot be recovered will be disposed of using a method that minimises any impact on the environment. Standard condition 1.4.1 will ensure that this position is maintained.

5. Minimising the Installation's environmental impact

Regulated activities can present different types of risk to the environment, these include odour, noise and vibration; accidents, fugitive emissions to air and water; as well as point source releases to air, discharges to ground or groundwater, global warming potential and generation of waste. Consideration may also have to be given to the effect of emissions being subsequently deposited onto land (where there are ecological receptors). All these factors are discussed in this and other sections of this document.

For an installation of this kind, the principal emissions are those to air, although we also consider those to land and water.

The next sections of this document explain how we have approached the critical issue of assessing the likely impact of the emissions to air from the Installation on human health and the environment and what measures we are requiring to ensure a high level of protection.

5.1 Assessment Methodology

5.1.1 Application of Environment Agency H1 Guidance

A methodology for risk assessment of point source emissions to air, which we use to assess the risk of applications we receive for permits, is set out in our Horizontal Guidance Note H1 and has the following steps:

- Describe emissions and receptors
- Calculate process contributions
- Screen out insignificant emissions that do not warrant further investigation
- Decide if detailed air modelling is needed
- Assess emissions against relevant standards
- Summarise the effects of your emissions

The H1 methodology uses a concept of “process contribution (PC)”, which is the estimated concentration of emitted substances after dispersion into the receiving environmental media at the point where the magnitude of the concentration is greatest. The guidance provides a simple method of calculating PC primarily for screening purposes and for estimating process contributions where environmental consequences are relatively low. It is based on using dispersion factors. These factors assume worst case dispersion conditions with no allowance made for thermal or momentum plume rise and so the process contributions calculated are likely to be an overestimate of the actual maximum concentrations. More accurate calculation of process contributions can be achieved by mathematical dispersion models, which take into account relevant parameters of the release and surrounding conditions, including local meteorology – these techniques are expensive but normally lead to a lower prediction of PC.

5.1.2 Use of Air Dispersion Modelling

For incineration applications, we normally require the Applicant to submit a full air dispersion model as part of their application. Air dispersion modelling enables the process contribution to be predicted at any environmental receptor that might be impacted by the plant.

Once short-term and long-term PCs have been calculated in this way, they are compared with Environmental Quality Standards (EQS) referred to as “benchmarks” in the H1 Guidance.

Where an EU EQS exists, the relevant standard is the EU EQS. Where an EU EQS does not exist, our guidance sets out a National EQS (also referred to as Environmental Assessment Level - EAL) which has been derived to provide a similar level of protection to Human Health and the Environment as the EU EQS levels. In a very small number of cases, e.g. for emissions of Lead, the National EQS is more stringent that the EU EQS. In such cases, we use the National EQS standard for our assessment.

National EQSs do not have the same legal status as EU EQSs, and there is no explicit requirement to impose stricter conditions than BAT in order to comply with a national EQS. However, national EQSs are a standard for harm and any significant contribution to a breach is likely to be unacceptable.

PCs are considered **Insignificant** if:

- the **long-term** process contribution is less than **1%** of the relevant EQS; and
- the **short-term** process contribution is less than **10%** of the relevant EQS.

The **long term** 1% process contribution insignificance threshold is based on the judgements that:

- It is unlikely that an emission at this level will make a significant contribution to air quality;
- The threshold provides a substantial safety margin to protect health and the environment.

The **short term** 10% process contribution insignificance threshold is based on the judgements that:

- spatial and temporal conditions mean that short term process contributions are transient and limited in comparison with long term process contributions;
- the proposed threshold provides a substantial safety margin to protect health and the environment.

Where an emission is screened out in this way, we would normally consider that the Applicant's proposals for the prevention and control of the emission to be BAT. That is because if the impact of the emission is already insignificant, it follows that any further reduction in this emission will also be insignificant.

However, where an emission cannot be screened out as insignificant, it does not mean it will necessarily be significant.

For those pollutants which do not screen out as insignificant, we determine whether exceedences of the relevant EQS are likely. This is done through detailed audit and review of the Applicant's air dispersion modelling taking background concentrations and modelling uncertainties into account. Where an exceedence of an EU EQS is identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation or refuse the application. Whether or not exceedences are considered likely, the application is subject to the requirement to operate in accordance with BAT.

This is not the end of the risk assessment, because we also take into account local factors (for example, particularly sensitive receptors nearby such as a SSSIs, SACs or SPAs). These additional factors may also lead us to include more stringent conditions than BAT.

If, as a result of reviewing of the risk assessment and taking account of any additional techniques that could be applied to limit emissions, we consider that emissions **would cause significant pollution**, we would refuse the Application.

5.2 Assessment of Impact on Air Quality

The Applicant's assessment of the impact of air quality is set out in the following sections of the Application:

- Air Quality assessment of emissions from Grimsby Renewable Power Facility Final Report 20th February 2014,
- Addendum to Air Quality assessment of emissions from Grimsby Renewable Power Facility: metals and B[a]P,
- Addendum to Air Quality assessment of emissions from Grimsby Renewable Power Facility: Human Health Risk Assessment for dioxins
- Air Quality assessment of emissions from Grimsby Renewable Power Facility Final Report 31 July 2014
- Addendum to Air quality assessment of emissions from Grimsby renewable Power Facility: 30-minute ELV's. 29th August 2014
- Addendum to Air quality assessment of emissions from Grimsby renewable Power Facility: Human Health Risk Assessment for dioxins 29th August 2014
- Addendum to Air quality assessment of emissions from Grimsby renewable Power Facility: Human Health Risk Assessment for abnormal dioxins 01 Sept 2014
- Addendum to Air quality assessment of emissions from Grimsby renewable Power Facility: abnormal emissions 01 Sept 2014
- Air Quality assessment of emissions from Grimsby Renewable Power Facility Final Report 3rd October 2014
- Air Quality assessment of emissions from Grimsby Renewable Power Facility Final Report 8th October 2014

The assessment comprises:

- Dispersion modelling of emissions to air from the operation of the proposed incinerator.
- A study of the impact of emissions on nearby sensitive habitats and conservation sites.
- Dispersion modelling of the impact of additional road traffic arising from the operation of the incinerator.

Of these, the amenity impacts during construction and air quality impacts arising from additional road traffic have not been considered as these are essentially matters for the local planning authority when considering the

parallel application for planning permission, and outside the scope of our determination under the Environmental Permitting Regulations.

This section of the decision document deals primarily with the dispersion modelling of emissions to air from the incinerator chimney and its impact on local air quality. The impact on conservation sites is considered in section 5.4 and odour impacts during plant shut down are considered in section 5.6.

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 5 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of meteorological data collected from the weather station at Donna Nook approximately 20 km to the south east of the site between 2009 and 2013. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

The air impact assessments, and the dispersion modelling upon which they were based, employed the following assumptions.

- First, they assumed that the ELVs in the Permit would be the maximum permitted by Article 46(2) of the IED. These substances are:
    - Oxides of nitrogen (NO_x), expressed as NO_2
    - Total dust
    - Carbon monoxide (CO)
    - Sulphur dioxide (SO_2)
    - Hydrogen chloride (HCl)
    - Hydrogen fluoride (HF)
    - Metals (Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel and Vanadium)
    - Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (referred to as dioxins and furans)
    - Gaseous and vaporous organic substances, expressed as Total Organic Carbon (TOC)
- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term emission limit values, i.e. the maximum permitted emission rate (except for emissions of arsenic, chromium and nickel, which are considered in section 5.2.3 of this decision document).
- Third, the model also considered emissions of pollutants not covered by Annex VI of IED, specifically ammonia (NH_3), nitrous oxide (N_2O) and Polycyclic Aromatic Hydrocarbons (PAH). Emission rates used in the modelling have been drawn from data in the Waste Incineration BREF and are considered further in section 5.2.5.

We are in agreement with this approach. The assumptions underpinning the model have been checked and are reasonably precautionary.

The Applicant has carried out background air quality monitoring to augment the data available from local authority monitoring. This data is summarised in

the Application and has been used by the Applicant to establish the background (or existing) air quality against which to measure the potential impact of the incinerator.

As well as calculating the peak ground level concentration, the Applicant has modelled the concentration of key pollutants at a number of specified locations within the surrounding area.

The way in which the Applicant used dispersion models, its selection of input data, use of background data and the assumptions it made have been reviewed by the Environment Agency's modelling specialists to establish the robustness of the Applicant's air impact assessment. The output from the model has then been used to inform further assessment of health impacts and impact on habitats and conservation sites.

Our review of the Applicant's assessment leads us to agree with the Applicant's conclusions. We have also audited the air quality and human health impact assessment and similarly agree that the conclusions drawn in the reports were acceptable.

The Applicant's modelling predictions are summarised in the following sections.

5.2.1 Assessment of Air Dispersion Modelling Outputs

The Applicant's modelling predictions are summarised in the tables below. The figures shown indicate the predicted peak ground level exposure to pollutants in ambient air. Whilst we have used the Applicant's modelling predictions in the table below, we have made our own simple verification calculation of the percentage process contribution and predicted environmental concentration. These are the numbers shown in the tables below and so may be very slightly different to those shown in the Application. Any such minor discrepancies do not materially impact on our conclusions.

(i) Screening out emissions which are insignificant

From the table below it can be seen that all pollutants screen out as the process contributions are either <1% of the long term or <10% of the short term EAQ/EAL.

Pollutant	**EQS / EAL**		**Back-ground**	**Process Contribution (PC)**	
	µg/m^3		**µg/m^3**	**µg/m^3**	**% of EAL**
NO_2	40	1	31.5	0.13	0.33
	200	2	63	6.1	3.1
PM_{10}	40	1	16.8	0.009	0.02
	50	3	33.6	0.04	0.08

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)	
	µg/m³		µg/m³	µg/m³	% of EAL
$PM_{2.5}$	25	1	11.6	0.0018	0.01
SO_2	266	4	14	11.1	4.2
	350	5	14	8.4	2.40
	125	6	14	0.65	0.5
HCl	750	7		0.7	0.0933333
HF	16	8		0.003	0.02
	160	7		0.07	0.04375
CO	10000	9	274	0.1	0.00
	30000	10	548	6.7	0.02
TOC	2.25	1	0	0.009	0.40
PAH	0.00025	1		9.9E-08	0.04
NH_3	180	1	0.81	0.007	0.00
	2500	10	0.81	0.5	0.02
PCBs	0.2	1	0.107	2.60E-10	0.00
	6	10	0.107	3.79E-04	0.01
Dioxins			0.094	9.20E-02	

Note

	TOC as 1,3 butadiene
	PAH as benzo[a]pyrene
1	Annual Mean
2	99.79th %ile of 1-hour means
3	90.41st %ile of 24-hour means
4	99.9th ile of 15-min means
5	99.73rd %ile of 1-hour means
6	99.18th %ile of 24-hour means
7	1-hour average
8	Monthly average
9	Maximum daily running 8-hour mean
10	1-hour maximum

Therefore, generally we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation subject to the detailed audit referred to below.

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO_2)

The impact on air quality from NO_2 emissions has been assessed against the EU EQS of 40 $\mu g/m^3$ as a long term annual average and a short term hourly average of 200 $\mu g/m^3$. The model assumes a 70% NO_x to NO_2 conversion for the long term and 35% for the short term assessment in line with Environment Agency guidance on the use of air dispersion modelling.

The above tables show that the peak long term PC is less than 1% of the EU EQS and the peak short term PC is less than 10% of the EU EQS and so can be screened out as insignificant. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

(ii) Particulate matter PM_{10} and $PM_{2.5}$

The impact on air quality from particulate emissions has been assessed against the EQS for PM_{10} (particles of 10 microns and smaller) and $PM_{2.5}$ (particles of 2.5 microns and smaller). For PM_{10}, the EUEQS are a long term annual average of 40 $\mu g/m^3$ and a short term daily average of 50 $\mu g/m^3$. For $PM_{2.5}$ the EUEQS of 25 $\mu g/m^3$ as a long-term annual average to be achieved by 2010 as a Target Value and by 2015 as a Limit Value has been used.

The Applicant's predicted impact of the Installation against these EQSs is shown in the tables above. The assessment assumes that **all** particulate emissions are present as PM_{10} for the PM_{10} assessment and that **all** particulate emissions are present as $PM_{2.5}$ for the $PM_{2.5}$ assessment.

The above assessment is considered to represent a worst case assessment in that: -

- It assumes that the plant emits particulates continuously at the IED Annex VI limit for total dust, whereas actual emissions from similar plant are normally in the range 1 to 5 mg/m^3.
- It assumes all particulates emitted are below either 10 microns (PM_{10}) or 2.5 microns ($PM_{2.5}$), when some are expected to be larger.

We have reviewed the Applicant's particulate matter impact assessment and are satisfied in the robustness of the Applicant's conclusions.

The above assessment shows that the predicted process contribution for emissions of PM_{10} is below 1% of the long term EQS and below 10% of the short term EQS and so can be considered insignificant. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of particulates to be BAT for the Installation.

The above assessment also shows that the predicted process contribution for emissions of $PM_{2.5}$ is also below 1% of the Environmental Quality Objective.

Therefore the Environment Agency concludes that particulate emissions from the installation, including emissions of PM_{10} or $PM_{2.5}$, will not give rise to significant pollution.

There is currently no emission limit prescribed nor any continuous emissions monitor for particulate matter specifically in the PM_{10} or $PM_{2.5}$ fraction. Whilst the Environment Agency is confident that current monitoring techniques will capture the fine particle fraction ($PM_{2.5}$) for inclusion in the measurement of total particulate matter, an improvement condition has been included that will require a full analysis of particle size distribution in the flue gas, and hence determine the ratio of fine to coarse particles. In the light of current knowledge and available data however the Environment Agency is satisfied that the health of the public would not be put at risk by such emissions.

(iii) Acid gases, SO_2, HCl and HF

From the table above, emissions of HCl and HF can be screened out as insignificant in that the process contribution is <10% of the short term EQS/EAL. There is no long term EQS/EAL for HCl. HF has 2 assessment criteria – a 1-hr EAL and a monthly EAL – the process contribution is <1% of the monthly EAL and so the emission is insignificant if the monthly EAL is interpreted as representing a long term EAL.

There is no long term EAL for SO_2 for the protection of human health. Protection of ecological receptors from SO_2 for which there is a long term EAL is considered in section 5.4.

Emissions of SO_2 can also be screened out as insignificant in that the short term process contribution is also <10% of each of the three short term EUEQS values. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

(iv) Emissions to Air of CO, VOCs, PAHs, PCBs, Dioxins and NH_3

The above tables show that for CO and VOC emissions, the peak long term PC is less than 1% of the EAL/EQS and the peak short term PC is less than 10% of the EAL/EQS and so can be screened out as insignificant. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

The Applicant has used the EQS for 1,3 butadiene for their assessment of the impact of VOC. This is based on 1,3 butadiene having the lowest EQS of organic species likely to be present in VOC (other than PAH, PCBs, dioxins and furans). The Applicant has also used the EQS for benzo[a]pyrene (BaP) for their assessment of the impact of PAH. We agree that the use of the BaP EQS is sufficiently precautionary.

There is no EAL for dioxins and furans as the principal exposure route for these substances is by ingestion and the risk to human health is through the accumulation of these substances in the body over an extended period of time. This issue is considered in more detail in section 5.3

From the tables above all the other emissions can be screened out as insignificant in that the process contribution is < 1% of the long term EQS/EAL and <10% of the short term EAQ/EAL.

The ammonia emission is based on a release concentration of 10 mg/m^3. We are satisfied that this level of emission is consistent with the operation of a well controlled SCR NO_x abatement system.

The Applicant is required to prevent, minimise and control PAH and VOC emissions using the best available techniques, this is considered further in Section 6. We are satisfied that PAH and VOC emissions will not result in significant pollution.

In summary for the above emissions to air, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the Best Available Techniques to prevent and minimise emissions of these substances. This is reported in section 6 of this document. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of CO, NH_3, PAHs and PCBs to be BAT for the Installation. Dioxins and furans are considered further in section 5.3.2.

5.2.3 Assessment of Emission of Metals

The Applicant has assessed the impact of metal emissions to air, as previously described.

Annex VI of IED sets three limits for metal emissions:

- An emission limit value of 0.05 mg/m^3 for mercury and its compounds (formerly WID group 1 metal).
- An aggregate emission limit value of 0.05 mg/m^3 for cadmium and thallium and their compounds (formerly WID group 2 metals).
- An aggregate emission limit of 0.5 mg/m^3 for antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium and their compounds (formerly WID group 3 metals).

In addition the UK is a Party to the Heavy Metals Protocol within the framework of the UN-ECE Convention on long-range trans-boundary air pollution. Compliance with the IED Annex VI emission limits for metals along with the Application of BAT also ensures that these requirements are met.

Where Annex VI of the IED sets an aggregate limit, the Applicant's assessment assumes that each metal is emitted individually at the relevant aggregate emission limit value. This is a something which can never actually occur in practice as it would inevitably result in a breach of the said limit, and so represents a very much worst case scenario.

Pollutant	EQS / EAL		Back-ground	Process Contribution at sensitive receptors	
	µg/m^3		µg/m^3	µg/m^3	% of EAL
Cd	0.005	1	0.00018	0.00005	1.0
Tl		1		0.00005	
Hg	0.25	1		0.00005	0.02
	7.5	2		0.0031	0.04
Sb	5	1		0.009	0.18
	150	2		0.031	0.02
Pb	0.25	1	0.017	0.003	1.20
Co		1		0.0005	
Cu	10	1		0.002	0.02
	200	2		0.006	0.00
Mn	0.15	1	0.065	0.002	1.33
	1500	2		0.06	0.00
V	5	1		0.009	0.18
	1	3		0.034	3.40
As (100%)	0.003	1	0.00077	0.0005	16.67
As (11%)	0.003	1	0.00077	0.00005	1.67
Cr (II)(III)	5	1	0.001	0.001	0.02
	150	2	0.001	0.002	0.00
Cr (VI)(100%)	0.0002	1	0.00100	0.0005	250.00
Cr (VI)(11%)	0.0002	1	0.00100	0.00005	25.00
Cr (VI)(SPEC)	0.0002	1		0.00000086	0.43
Ni (100%)	0.02	1	0.0012	0.0005	2.50
Ni (11%)	0.02	1	0.0012	0.0001	0.25

1	Annual Mean
2	1-hr Maximum
3	24-hr Maximum

In section 5.2.1 above, not all emissions of metals were screened out as insignificant:

This left emissions of Pb, Mn, V, As, Cr (VI) & Ni requiring further assessment. This means that for emissions of these metals, the assessment predicts that an exceedence of the relevant EAL could occur. For all other

metals, the Applicant has concluded that exceedences of the EAL are not likely to occur.

Looking at the metals requiring further assessment and taking account of background concentrations, and the impact at the local sensitive receptors it can be seen that if the PEC (predicted environmental concentration) at the sensitive receptor is <100% these metals can be predicted to have no exceedences of the relevant EAL.

Pollutant	**EQS / EAL**		**Back-ground**	**Process Contribution at sensitive receptors**		**Predicted Environmental Concentration**	
	µg/m^3		**µg/m^3**	**µg/m^3**	**% of EAL**	**µg/m^3**	**% of EAL**
Pb	0.25	1	0.017	0.003	1.20	0.02000	8.00
Mn	0.15	1	0.065	0.002	1.33	0.067	44.67
V	1	3		0.034	3.40	0.03400	3.40
As (100%)	0.003	1	0.00077	0.0005	16.67	0.00127	42.3
As (11%)	0.003	1	0.00077	0.00005	1.67	0.00082	27.3
Cr (VI)(SPEC)	0.0002	1		0.00000086	0.43	0.00000	0.4
Ni (100%)	0.02	1	0.0012	0.0005	2.50	0.00170	8.5

1	Annual Mean
2	1-hr Maximum
3	24-hr Maximum

The 2009 report of the Expert Panel on Air Quality Standards (EPAQS) – "Guidelines for Metal and Metalloids in Ambient Air for the Protection of Human Health", sets new ambient air quality guidelines for Arsenic, Nickel and Chromium (VI). These guidelines have been incorporated as EALs in the revised H1 Guidance issued by the Agency in 2010.

Chromium (VI) is not specifically referenced in Annex VI of IED, which includes only total Chromium as one of the nine Group 3 metals, the impact of which has been assessed above. The EPAQS guidelines refer only to that portion of the metal emissions contained within PM_{10} in ambient air. The new guideline for Chromium (VI) is 0.2 ng/m^3.

- Measurement of Chromium (VI) at the levels anticipated at the stack emission points is expected to be difficult, with the likely levels being below the level of detection by the most advanced methods. We have considered the concentration of total chromium and chromium (VI) in the APC residues collected upstream of the emission point for existing Municipal Waste incinerators and have assumed these to be similar to the particulate matter released from the emission point. This data shows that the mean Cr(VI) emission concentration (based on the bag dust ratio) is $3.5 * 10^{-5}$ mg/m^3 (max $1.3 * 10^{-4}$).

Based on this data, we consider it remains a conservative assumption for the Applicant to consider that the Cr(VI) emission concentration at the nearest sensitive receptor will be 0.00000086 mg/m^3.

The Applicant has used the above data to model the predicted Cr(VI) impact at the nearest sensitive receptor. The PC is predicted as 0.43%, the PEC is predicted as 0.4%.

This assessment shows that emissions of Chromium (VI) are likely to be insignificant.

We agree with the Applicant's conclusions.

5.2.4 Consideration of Local Factors

There were no specific local factors which needed to be addressed within the determination of the site.

(i) Impact on Air Quality Management Areas (AQMAs)

No Air Quality Management Areas (AQMAs) have been declared within an area likely to be affected by emissions from the incinerator.

5.3 Human health risk assessment

5.3.1 Our role in preventing harm to human health

The Environment Agency has a statutory role to protect the environment and human health from all processes and activities it regulates. We assessed the effects on human health for this application in the following ways:

i) Applying Statutory Controls

The plant will be regulated under EPR. These regulations include the requirements of relevant EU Directives, notably, the industrial emissions directive (IED), the waste framework directive (WFD), and air quality directive (AQD).

The main conditions in an EfW permit are based on the requirements of the IED. Specific conditions have been introduced to specifically ensure compliance with the requirements of Chapter IV. The aim of the IED is to prevent or, where that is not practicable, to reduce emissions to air, water and land and prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole. IED achieves this aim by setting operational conditions, technical requirements and emission limit values to meet the requirements set out in Articles 11 and 18 of the IED.

These requirements include the application of BAT, which may in some circumstances dictate tighter emission limits and controls than those set out in Chapter IV of IED on waste incineration and co-incineration plants. The assessment of BAT for this installation is detailed in section 6 of this document.

ii) Environmental Impact Assessment

Industrial activities can give rise to odour, noise and vibration, accidents, fugitive emissions to air and water, releases to air (including the impact on Photochemical Ozone Creation Potential (POCP)), discharges to ground or groundwater, global warming potential and generation of waste. For an installation of this kind, the principal environmental effects are through emissions to air, although we also consider all of the other impacts listed. Section 5.1 and 5.2 above explain how we have approached the critical issue of assessing the likely impact of the emissions to air from the Installation on human health and the environment and any measures we are requiring to ensure a high level of protection.

iii) Expert Scientific Opinion

We take account of the views of national and international expert bodies. Following is a summary of some of the publications which we have considered (in no particular order).

An independent review of evidence on the health effects of municipal waste incinerators was published by **DEFRA** in 2004. It concluded that there was no convincing link between the emissions from MSW incinerators and adverse effects on public health in terms of cancer, respiratory disease or birth defects. On air quality effects, the report concluded "Waste incinerators contribute to local air pollution. This contribution, however, is usually a small proportion of existing background levels which is not detectable through environmental monitoring (for example, by comparing upwind and downwind levels of airborne pollutants or substances deposited to land). In some cases, waste incinerator facilities may make a more detectable contribution to air pollution. Because current MSW incinerators are located predominantly in urban areas, effects on air quality are likely to be so small as to be undetectable in practice."

A Position Statement issued by the **HPA** in 2009 states that "The Health Protection Agency has reviewed research undertaken to examine the suggested links between emissions from municipal waste incinerators and effects on health. While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable".

Policy Advice from Government also points out that the minimal risk from modern incinerators. Paragraph 22 (Chapter 5) of WS2007 says that "research carried out to date has revealed no credible evidence of adverse

health outcomes for those living near incinerators." It points out that "the relevant health effects, mainly cancers, have long incubation times. But the research that is available shows an absence of symptoms relating to exposures twenty or more years ago when emissions from incinerators were much greater than is now the case." **Paragraph 30 of PPS10** explains that "modern, appropriately located, well run and well regulated waste management facilities should pose little risk to public health."

The **Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (CoC) issued** a statement in 2000 which said that "any potential risk of cancer due to residency (for periods in excess of 10 years) near to municipal solid waste incinerators was exceedingly low and probably not measurable by the most modern epidemiological techniques." In 2009, CoC considered six further relevant epidemiological papers that had been published since the 2000 statement, and concluded that "there is no need to change the advice given in the previous statement in 2000 but that the situation should be kept under review".

Republic of Ireland Health Research Board report stated that "It is hard to separate the influences of other sources of pollutants, and other causes of cancer and, as a result, the evidence for a link between cancer and proximity to an incinerator is not conclusive".

The **Food Safety Authority of Ireland (FSAI) (2003)** investigated possible implications on health associated with food contamination from waste incineration and concluded: "In relation to the possible impact of introduction of waste incineration in Ireland, as part of a national waste management strategy, on this currently largely satisfactory situation, the FSAI considers that such incineration facilities, if properly managed, will not contribute to dioxin levels in the food supply to any significant extent. The risks to health and sustainable development presented by the continued dependency on landfill as a method of waste disposal far outweigh any possible effects on food safety and quality."

Health Protection Scotland (2009) considered scientific studies on health effects associated with the incineration of waste particularly those published after the Defra review discussed earlier. The main conclusions of this report were: "(a) For waste incineration as a whole topic, the body of evidence for an association with (non-occupational) adverse health effects is both inconsistent and inconclusive. However, more recent work suggests, more strongly, that there may have been an association between emissions (particularly dioxins) in the past from industrial, clinical and municipal waste incinerators and some forms of cancer, before more stringent regulatory requirements were implemented. (b) For individual waste streams, the evidence for an association with (non-occupational) adverse health effects is inconclusive. (c) The magnitude of any past health effects on residential populations living near incinerators that did occur is likely to have been small. (d) Levels of airborne emissions from individual incinerators should be lower now than in the past, due to stricter legislative controls and improved technology. Hence, any risk to

the health of a local population living near an incinerator, associated with its emissions, should also now be lower."

The **US National Research Council Committee on Health Effects of Waste Incineration (NRC) (NRC 2000)** reviewed evidence as part of a wide ranging report. The Committee view of the published evidence was summarised in a key conclusion: "Few epidemiological studies have attempted to assess whether adverse health effects have actually occurred near individual incinerators, and most of them have been unable to detect any effects. The studies of which the committee is aware that did report finding health effects had shortcomings and failed to provide convincing evidence. That result is not surprising given the small populations typically available for study and the fact that such effects, if any, might occur only infrequently or take many years to appear. Also, factors such as emissions from other pollution sources and variations in human activity patterns often decrease the likelihood of determining a relationship between small contributions of pollutants from incinerators and observed health effects. Lack of evidence of such relationships might mean that adverse health effects did not occur, but it could mean that such relationships might not be detectable using available methods and sources."

The **British Society for Ecological Medicine (BSEM) published a report in 2005** on the health effects associated with incineration and concluded that "Large studies have shown higher rates of adult and childhood cancer and also birth defects around municipal waste incinerators: the results are consistent with the associations being causal. A number of smaller epidemiological studies support this interpretation and suggest that the range of illnesses produced by incinerators may be much wider. Incinerator emissions are a major source of fine particulates, of toxic metals and of more than 200 organic chemicals, including known carcinogens, mutagens, and hormone disrupters. Emissions also contain other unidentified compounds whose potential for harm is as yet unknown, as was once the case with dioxins. Abatement equipment in modern incinerators merely transfers the toxic load, notably that of dioxins and heavy metals, from airborne emissions to the fly ash. This fly ash is light, readily windborne and mostly of low particle size. It represents a considerable and poorly understood health hazard."

The BSEM report was reviewed by the HPA and they concluded that "Having considered the BSEM report the HPA maintains its position that contemporary and effectively managed and regulated waste incineration processes contribute little to the concentrations of monitored pollutants in ambient air and that the emissions from such plants have little effect on health." The BSEM report was also commented on by the consultants who produced the Defra 2004 report referred to above. They said that "It fails to consider the significance of incineration as a source of the substances of concern. It does not consider the possible significance of the dose of pollutants that could result from incinerators. It does not fairly consider the adverse effects that could be associated with alternatives to incineration. It relies on inaccurate and outdated material. In view of these shortcomings, the report's conclusions with regard to the health effects of incineration are not reliable."

A **Greenpeace** review on incineration and human health concluded that a broad range of health effects have been associated with living near to incinerators as well as with working at these installations. Such effects include cancer (among both children and adults), adverse impacts on the respiratory system, heart disease, immune system effects, increased allergies and congenital abnormalities. Some studies, particularly those on cancer, relate to old rather than modern incinerators. However, modern incinerators operating in the last few years have also been associated with adverse health effects."

The Health Protection Scotland report referred to above says that "the authors of the Greenpeace review do not explain the basis for their conclusion that there is an association between incineration and adverse effects in terms of criteria used to assess the strength of evidence. The weighting factors used to derive the assessment are not detailed. The objectivity of the conclusion cannot therefore be easily tested."

From this published body of scientific opinion, we take the view stated by the HPA that "While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable". We therefore ensure that permits contain conditions which require the installation to be well-run and regulate the installation to ensure compliance with such permit conditions.

iv) Health Risk Models

Comparing the results of air dispersion modelling as part of the H1 Environmental Impact assessment against European and national air quality standards effectively makes a health risk assessment for those pollutants for which a standard has been derived. These air quality standards have been developed primarily in order to protect human health via known intake mechanisms, such as inhalation and ingestion. Some pollutants, such as dioxins and furans, have human health impacts at lower ingestion levels than lend themselves to setting an air quality standard to control against. For these pollutants, a different human health risk model is required which better reflects the level of dioxin intake.

Dioxin Intake Models: Two models are available to predict the dioxin intake for comparison with the Tolerable Daily Intake (TDI) recommended by the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment, known as COT. These are HHRAP and the HMIP model.

HHRAP has been developed by the US EPA to calculate the human body intake of a range of carcinogenic pollutants and to determine the mathematic quantitative risk in probabilistic terms. In the UK, in common with other European Countries, we consider a threshold dose below which the likelihood of an adverse effect is regarded as being very low or effectively zero. The HMIP model uses a similar approach to the HHRAP model, but does not

attempt to predict probabilistic risk. Either model can however be used to make comparisons with the TDI.

The TDI is the amount of a substance that can be ingested daily over a lifetime without appreciable health risk. It is expressed in relation to bodyweight in order to allow for different body size, such as for children of different ages. In the UK, the COT has set a TDI for dioxins and furans of 2 picograms I-TEQ/Kg-body weight/day (N.B. a picogram is a million millionths (10^{-12}) of a gram).

In addition to an assessment of risk from dioxins and furans, the HHRAP model enables a risk assessment from human intake of a range of heavy metals. The HMIP report does not consider metals. In principle, the respective EQS for these metals are protective of human health. It is not therefore necessary to model the human body intake.

COMEAP developed a methodology based on the results of time series epidemiological studies which allows calculation of the public health impact of exposure to the classical air pollutants (NO_2, SO_2 and particulates) in terms of the numbers of "deaths brought forward" and the "number of hospital admissions for respiratory disease brought forward or additional". COMEAP has issued a statement expressing some reservations about the applicability of applying its methodology to small affected areas. Those concerns generally relate to the fact that the exposure-response coefficients used in the COMEAP report derive from studies of whole urban populations where the air pollution climate may differ from that around a new industrial installation. COMEAP identified a number of factors and assumptions that would contribute to the uncertainty of the estimates. These were summarised in the Defra review as below:

- Assumption that the spatial distribution of the air pollutants considered is the same in the area under study as in those areas, usually cities or large towns, in which the studies which generated the coefficients were undertaken.
- Assumption that the temporal pattern of pollutant concentrations in the area under study is similar to that in the areas in which the studies which generated the coefficients were undertaken (i.e. urban areas).
- It should be recognised that a difference in the pattern of socio-economic conditions between the areas to be studied and the reference areas could lead to inaccuracy in the predicted level of effects.
- In the same way, a difference in the pattern of personal exposures between the areas to be studied and the reference areas will affect the accuracy of the predictions of effects.

The use of the COMEAP methodology is not generally recommended for modelling the human health impacts of individual installations. However it may have limited applicability where emissions of NO_x, SO_2 and particulates cannot be screened out as insignificant in an H1 Environmental Impact assessment, there are high ambient background levels of these pollutants and we are advised that its use was appropriate by our public health consultees.

Our recommended approach is therefore the use of the H1 assessment methodology comparison for most pollutants (including metals) and dioxin intake models using either the HHRA or HMIP models as described above for dioxins and furans. Where an alternative approach is adopted for dioxins, we check the predictions ourselves using the HMIP methodology.

v) Consultations

As part of our normal procedures for the determination of a permit application, we would consult Public Health England and Director of Public Health, FSA and in some cases HPA. In this case the DPH responded stating no comment. We also consult the local communities who may raise health related issues. A public meeting was held. No health issues have been raised with us. Any issues raised by these consultations are considered in determining the application as described in Annex 4 of this document.

5.3.2 Assessment of Intake of Dioxins and Furans

For dioxins and furans, the principal exposure route is through ingestion, usually through the food chain, and the main risk to health is through accumulation in the body over a period of time.

The human health risk assessment calculates the dose of dioxins and furans that would be received by local receptors if all their food and water were sourced from the locality where the deposition of dioxins and furans is predicted to be the highest. This is then assessed against the Tolerable Daily Intake (TDI) levels established by the COT of 2 picograms I-TEQ / Kg bodyweight/ day.

The results of the Applicant's assessment of dioxin intake are detailed in the table below. (worst – case results for each category are shown). The results showed that the predicted daily intake of dioxins at all receptors, resulting from emissions from the proposed facility, were significantly below the recommended TDI levels. We therefore consider the intake of dioxins and furans resulting from the operation of the proposed installation to be insignificant, and believe it is unlikely that the COT TDI level of 2 picograms I-TEQ/Kg bodyweight/day will be exceeded.

Receptor	adult	child
Resident	1.2%	4.6%

Calculated maximum daily intake of dioxins by local receptors resulting from the operation of the proposed facility (I-TEQ/ kg-BW/day)

The FSA has reported that dietary studies have shown that estimated total dietary intakes of dioxins and dioxin-like PCBs from all sources by all age groups fell by around 50% between 1997 and 2001, and are expected to continue to fall. In 2001, the average daily intake by adults in the UK from diet was 0.9 pg WHO-TEQ/kg bodyweight. The additional daily intake predicted by the modelling as shown in the table above is substantially below this figure.

In 2010, FSA studied the levels of chlorinated, brominated and mixed (chlorinated-brominated) dioxins and dioxin-like PCBs in fish, shellfish, meat and eggs consumed in UK. It asked COT to consider the results and to advise on whether the measured levels of these PXDDs, PXDFs and PXBs indicated a health concern ('X' means a halogen). COT issued a statement in December 2010 and concluded that " The major contribution to the total dioxin toxic activity in the foods measured came from chlorinated compounds. Brominated compounds made a much smaller contribution, and mixed halogenated compounds contributed even less (1% or less of TDI). Measured levels of PXDDs, PXDFs and dioxin-like PXBs do not indicate a health concern". COT recognised the lack of quantified TEFs for these compounds but said that "even if the TEFs for PXDDs, PXDFs and dioxin-like PXBs were up to four fold higher than assumed, their contribution to the total TEQ in the diet would still be small. Thus, further research on PXDDs, PXDFs and dioxin-like PXBs is not considered a priority."

In the light of this statement, we assess the impact of chlorinated compounds as representing the impact of all chlorinated, brominated and mixed dioxins / furans and dioxin like PCBs.

5.3.3 Particulates smaller than 2.5 microns

The Operator will be required to monitor particulate emissions using the method set out in Table S3.1 of Schedule 3 of the Permit. This method requires that the filter efficiency must be at least 99.5 % on a test aerosol with a mean particle diameter of 0.3 µm, at the maximum flow rate anticipated. The filter efficiency for larger particles will be at least as high as this. This means that particulate monitoring data effectively captures everything above 0.3 µm and much of what is smaller. It is not expected that particles smaller than 0.3 µm will contribute significantly to the mass release rate / concentration of particulates because of their very small mass, even if present. This means that emissions monitoring data can be relied upon to measure the true mass emission rate of particulates.

Nano-particles are considered to refer to those particulates less than 0.1 µm in diameter ($PM_{0.1}$). Questions are often raised about the effect of nano-particles on human health, in particular on children's health, because of their high surface to volume ratio, making them more reactive, and their very small size, giving them the potential to penetrate cell walls of living organisms. The small size also means there will be a larger number of small particles for a given mass concentration. However the HPA statement (referenced below) says that due to the small effects of incinerators on local concentration of particles, it is highly unlikely that there will be detectable effects of any particular incinerator on local infant mortality.

The HPA addresses the issue of the health effects of particulates in their September 2009 statement 'The Impact on Health of Emissions to Air from Municipal Incinerators'. It refers to the coefficients linking PM_{10} and $PM_{2.5}$ with effects on health derived by COMEAP and goes on to say that if these

coefficients are applied to small increases in concentrations produced, locally, by incinerators; the estimated effects on health are likely to be small. The HPA notes that the coefficients that allow the use of number concentrations in impact calculations have not yet been defined because the national experts have not judged that the evidence is sufficient to do so. This is an area being kept under review by COMEAP.

In December 2010, COMEAP published a report on The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom. It says that "a policy which aims to reduce the annual average concentration of $PM_{2.5}$ by 1 $\mu g/m^3$ would result in an increase in life expectancy of 20 days for people born in 2008." However, "The Committee stresses the need for careful interpretation of these metrics to avoid incorrect inferences being drawn – they are valid representations of population aggregate or average effects, but they can be misleading when interpreted as reflecting the experience of individuals."

The HPA also point out that in 2007 incinerators contributed 0.02% to ambient ground level PM_{10} levels compared with 18% for road traffic and 22% for industry in general. The HPA note that in a sample collected in a day at a typical urban area the proportion of $PM_{0.1}$ is around 5-10% of PM_{10}. It goes on to say that PM_{10} includes and exceeds $PM_{2.5}$ which in turn includes and exceeds $PM_{0.1}$.

This is consistent with the assessment of this application which shows emissions of PM_{10} to air to be insignificant.

We take the view, based on the foregoing evidence, that techniques which control the release of particulates to levels which will not cause harm to human health will also control the release of fine particulate matter to a level which will not cause harm to human health.

5.3.4 Assessment of Health Effects from the Installation

We have assessed the health effects from the operation of this installation in relation to the above (sections 5.3.1 to 5.3.3). We have applied the relevant requirements of the national and European legislation in imposing the permit conditions. We are satisfied that compliance with these conditions will ensure protection of the environment and human health.

Taking into account all of the expert opinion available, we agree with the conclusion reached by the HPA that "While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable."

In carrying out air dispersion modelling as part of the H1 Environmental Impact assessment and comparing the predicted environmental concentrations with European and national air quality standards, the Applicant has effectively made a health risk assessment for many pollutants. These air

quality standards have been developed primarily in order to protect human health.

The Applicant's assessment of the impact from Nitrogen Dioxide, $PM_{10,}$ $PM_{2.5,}$ Sulphur Dioxide, Hydrogen Chloride, Hydrogen Fluoride, Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium (II and III) Chromium (VI), Cobalt, Copper, Manganese, Nickel, Vanadium, Ammonia, Dioxins, Furans, Polycyclic Aromatic Hydrocarbons (PAH) TOC and VOC's have all indicated that the Installation emissions screen out as insignificant.

The Environment Agency has reviewed the methodology employed by the Applicant to carry out the health impact assessment. The Environment Agency had some discussion with the applicant around the inclusion of dioxin-like PCB's, PAH's and abnormal emissions, however after further input from the applicant and our own check modelling we were able to agree the methodology employed by the applicant was satisfactory.

Overall, taking into account the conservative nature of the impact assessment (i.e. that it is based upon an individual exposed for a life-time to the effects of the highest predicted airborne concentrations and consuming mostly locally grown food), it was concluded that the operation of the proposed facility will not pose a significant carcinogenic or non-carcinogenic risk to human health.

The Director of Public Health and Public Health England were consulted on the Application and concluded that they had no significant concerns regarding the risk to the health of humans from the installation. The Food Standards Agency was also consulted during the permit determination but did not respond. Details of the responses provided by The Director of Public Health and Public Health England to the consultation on this Application can be found in Annex 4.

The Environment Agency is therefore satisfied that the Applicant's conclusions presented above are soundly based and we conclude that the potential emissions of pollutants including dioxins, furans and metals from the proposed facility are unlikely to have an impact upon human health.

5.4 Impact on Habitats sites, SSSIs, non-statutory conservation sites etc.

5.4.1 Sites Considered

The following Habitats are located within 10 km of the Installation: Humber Estuary SAC, SPA and Ramsar.

The following SSSI is located within 2 km of the Installation: Humber Estuary.

There are 14 non-statutory local wildlife and conservation sites within 2 km of the proposed Installation:

- Town's Croft Drain

- Freshney Parkway
- Moody Lane, Great Grimsby
- Alexandra Dock Railway siding
- River Freshney Grimsby
- Great Coates manor Farm
- Whitgift Boundary
- Land off Gilbey Road
- Tioxide West Field
- Freshney Parkway North
- Freshney Parkway LNR
- East Marsh Dockland
- Sweedale Croft Drain, and
- West Marsh Sidings

5.4.2 Habitats Assessment

The Applicant's habitats assessment was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that there would be no likely significant effect on the interest features of the protected sites.

Natural England were consulted during determination and they agreed with the Applicant's conclusions that the impacts from Grimsby Renewable Power Facility are unlikely to have a significant effect on sensitive features due to:

a) The maximum point of impact not containing the most sensitive features within the habitat
b) The maximum point of impact being submerged by water twice daily
c) The very conservative approach to modelling which used continuous emissions when only actually operating 7000hr per yr.

Table showing results of screening at Humber Estuary, SAC, SPA and Ramsar.

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
Oxides of Nitrogen	30	56.7	**1.1**	**3.6**	57.8	193
Sulphur dioxide	20	14	0.3	**1.5**	14.3	71
Ammonia	3	0.81	0.04	**1.3**	0.85	28
Hydrogen fluoride	5	-	0.05	**1**	-	-
Hydrogen fluoride	0.5	-	0.03	**6.7**	-	-

Note 1 All the above concentration figures are in $\mu g/m^3$

PCs are considered **Insignificant** if:

- the **long-term** process contribution is less than **1%** of the relevant EQS/EAL; and
- the **short-term** process contribution is less than **10%** of the relevant EQS/EAL.

The **long term** 1% process contribution insignificance threshold is based on the judgements that:

- It is unlikely that an emission at this level will make a significant contribution to air quality;
- The threshold provides a substantial safety margin to protect health and the environment.

The **short term** 10% process contribution insignificance threshold is based on the judgements that:

- spatial and temporal conditions mean that short term process contributions are transient and limited in comparison with long term process contributions;
- the proposed threshold provides a substantial safety margin to protect health and the environment.

The table above shows:-

For Hydrogen Fluoride, the short term PC is 1%, most likely due to the conservative nature of the modelling. We do not consider it necessary to carry out further assessment. Long term emissions screen out being under 10%.

The PCs for Sulphur Dioxide, Nitrogen Dioxide and Ammonia are greater than the 1% long term insignificance level, and hence we are required to take into account the background contribution.

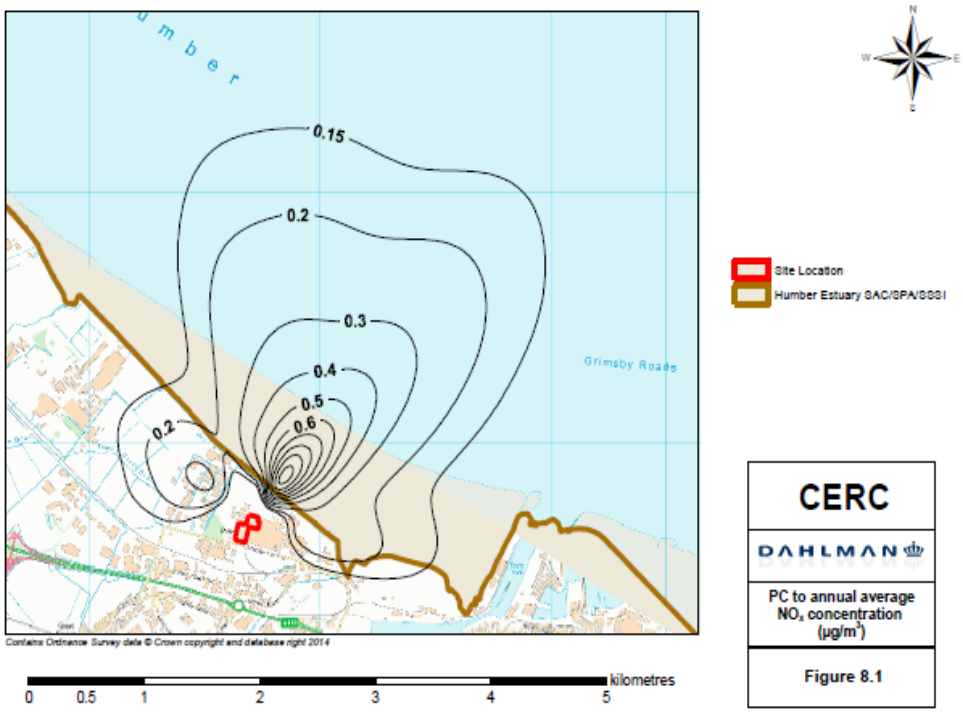
Looking at **Sulphur Dioxide** it can be seen that the PEC, as a percentage of the EAL, is 71%. This is only 1% above the normal threshold to require an in-combination assessment. However, the high level of Sulphur Dioxide can be attributed to the high background levels in the area. Based on the high background levels along with the conservative nature of the modelling, we consider that no further assessment is necessary and no likely significant effect from emissions of Sulphur Dioxide.

With respect to **Ammonia,** the PEC as a percentage of the EAL is 28% which is significantly below the normal threshold of 70% to require an in-combination assessment. Therefore no further assessment is necessary and no likely significant effect from emissions of Ammonia.

With respect to **Nitrogen dioxide**, the modelled maximum point of impact at the Humber Estuary SAC, SPA and Ramsar is NGR 525700, 411750, which is located within the interest feature described as ‘mud and sandflats not covered by seawater at low tide’. APIS data has confirmed that this interest feature is not sensitive to aerial emissions by virtue of the habitat being inundated twice daily by high tides, and therefore all exceedences noted within the modelling will not occur. This, along with the conservative approach

of the modelling, means it is unlikely to cause a significant impact at this designated site and no further assessment is necessary.

Figure below shows NO_x maximum point of impact on the Humber Estuary Mudflats.



Nutrient Nitrogen

The applicant modelled to predict the process contribution to the Nutrient nitrogen rates from the Grimsby Renewable Plant Facility, over the designated conservation areas.

Table showing total Nitrogen deposition (kg N ha^{-1} yr^{-1}) for the habitat types at the Humber Estuary.

Site name	Habitat type	Relevant Nitrogen Critical Load Class	Critical Load	Total nitrogen deposition
The Humber Estuary SAC, SPA & SSSI	Fixed dunes with herbaceous vegetation (grey dunes)	Coastal stable dune grasslands - acid type	8 - 10	31.08 (max) 10.78 (min) 16.99 (avg)
		Coastal stable dune grasslands - calcareous type	10 - 15	
	Embryonic shifting dunes	Shifting coastal dunes	10 - 20	
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)			
	Coastal lagoons	Pioneer, low-mid, mid-upper saltmarshes	20 - 30	
	Estuaries			
	Salicornia and other annuals colonising mud and sand			
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)			
	Dunes with *Hippophae rhamnoides*	"No comparable habitat with established critical load estimate available"	n/a	
	Mudflats and sand flats not covered by seawater at low tide	"No comparable habitat with established critical load estimate available"	n/a	
	Sandbanks which are slightly covered by sea water all the time	Not sensitive to eutrophication	n/a	

Table showing nitrogen deposition (kg N ha^{-1} yr^{-1}) at The Humber Estuary SAC, SPA and Ramsar.

Site name	Critical Load Class	Critical Load	Year	PC	PC as percentage of Critical Load	Screened out (< 1%)?
The Humber Estuary SAC, SPA & SSSI	Coastal stable dune grasslands - acid type	8 - 10	2009	0.22	1.5 – 3.5	No
			2010	0.15		
			2011	0.28		
			2012	0.22		
			2013	0.21		
	Coastal stable dune grasslands - calcareous type	10 - 15	2009	0.22	1.0 – 2.8	No
			2010	0.15		
			2011	0.28		
			2012	0.22		
			2013	0.21		
	Shifting coastal dunes	10 - 20	2009	0.22	0.8 – 2.8	No
			2010	0.15		
			2011	0.28		
			2012	0.22		
			2013	0.21		
	Pioneer, low-mid, mid-upper saltmarshes	20 - 30	2009	0.22	0.5 – 1.4	No
			2010	0.15		
			2011	0.28		
			2012	0.22		
			2013	0.21		

PCs are considered **Insignificant** if:

- the **long-term** process contribution is less than **1%** of the relevant Standard;

The **long term** 1% process contribution insignificance threshold is based on the judgements that:

- It is unlikely that an emission at this level will make a significant contribution to air quality;
- The threshold provides a substantial safety margin to protect health and the environment.

The PCs for the Humber Estuary SAC, SPA & Ramsar are greater than 1% of the Critical Load values listed for the Humber Estuary as a whole. Further assessment of the area shows that this is an overly conservative assumption, as the nearest habitats corresponding to the Critical Load values are situated several kilometres from the location of the maximum nitrogen deposition from the Grimsby Renewable Plant Facility. Therefore it is unlikely to cause a significant impact at the designated site.

Acid deposition

The applicant carried out modelling to predict the process contribution to the nitrogen deposition rates from the Grimsby Renewable Plant Facility, over the designated conservation areas. The results are presented in the tables below.

Table showing total acid deposition (keq ha^{-1} yr^{-1})

Site name	Habitat type	Relevant Acidity Critical Load Class	Critical Load	Total acid deposition
The Humber Estuary SAC, SPA & SSSI	Fixed dunes with herbaceous vegetation (grey dunes)	Acid grassland	MaxCLminN: 0.438 MaxCLMaxN: 4.548 MaxCLMaxS: 4.11 MinCLminN: 0.223 MinCLMaxN: 0.643 MinCLMaxS: 0.42	N:S 2.22|0.26 (max) 0.77|0.2 (min) 1.21|0.23 (avg)
		Calcareous grassland (using base cation)	MaxCLminN: 1.071 MaxCLMaxN: 5.071 MaxCLMaxS: 4 MinCLminN: 0.856 MinCLMaxN: 4.856 MinCLMaxS: 4	
	Embryonic shifting dunes	Not sensitive to acidification	n/a	
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)			
	Coastal lagoons			
	Estuaries			
	Salicornia and other annuals colonising mud and sand			
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)			
	Dunes with *Hippophae rhamnoides*	Acid grassland	MaxCLminN: 0.438 MaxCLMaxN: 4.548 MaxCLMaxS: 4.11 MinCLminN: 0.223 MinCLMaxN: 0.643 MinCLMaxS: 0.42	
	Mudflats and sand flats not covered by seawater at low tide	Not sensitive to acidification	n/a	
	Sandbanks which are slightly covered by sea water all the time	Not sensitive to acidification	n/a	

Table showing Contributions to acid deposition (keq ha^{-1} yr^{-1}) at the Humber Estuary

Site name	Vegetation type	Year	PC (N)	PC (S)	PC (H)
The Humber Estuary SAC, SPA & SSSI	Short vegetation	2009	0.016	0.02	0.011
		2010	0.011	0.02	0.008
		2011	0.020	0.03	0.014
		2012	0.015	0.02	0.012
		2013	0.015	0.02	0.009

For each identified habitat, CLmaxS, CLmaxN and CLminN (minCLmaxS, minCLmaxN and minCLminN for the Humber Estuary), as presented in the table above were input to the modelling tool, along with background deposition.

Table showing results of APIS Critical Load function Tool

Site name	Habitat type	Acidity Critical Load Class	PC as % of CL function	Screened out?
The Humber Estuary SAC, SPA & SSSI	Fixed dunes with herbaceous vegetation (grey dunes)	Acid grassland	9.3	No
		Calcareous grassland (using base cation)	1.2	No

The PC as a percentage of the Critical Load function for the Humber Estuary SAC, SPA & Ramsar is greater than 1% when using the most stringent Critical Load values. Further assessment of the area, however shows that this is an overly conservative assumption. The calculation is based on the most stringent criteria, corresponding to *fixed dunes with herbaceous vegetation (grey dunes) and Dunes with Hippophae rhamnoides,* habitats, which are likely to be several kilometres from the facility. All other habitats identified within the Humber Estuary are labelled not sensitive to acidification.

It is considered therefore, that acid deposition (including HCl) from the Grimsby Renewable Power Facility at the Humber Estuary can be screened out as being insignificant.

In conclusion, although there are exceedences of NO_x, nutrient nitrogen and acid deposition, the point of maximum concentration does not occur at the most sensitive locations within the SAC, SPA and Ramsar. Also, the maximum concentrations occur on the mudflats which are submerged by water twice in 24 hours. This along with the very conservative nature of the modelling means there is unlikely to be any significant effects at the designated sites.

5.4.3 SSSI Assessment

The Applicant's assessment of SSSIs was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that the proposal does not damage the special features of the SSSI(s).

There is one SSSI within the distance criteria, which is The Humber Estuary. This site overlays the Humber Estuary SAC, SPA and Ramsar, therefore the

above assessment can be used to determine any significant impacts on this SSSI. The above assessment in section 5.4.2 shows no likely significant effects on the sensitive habitats.

5.4.4 Assessment of Non-Statutory Sites

There are 14 non-statutory local wildlife and conservation sites within 2 km of the proposed Installation.

- Town's Croft Drain
- Freshney Parkway
- Moody Lane, Great Grimsby
- Alexandra Dock Railway siding
- River Freshney Grimsby
- Great Coates manor Farm
- Whitgift Boundary
- Land off Gilbey Road
- Tioxide West Field
- Freshney Parkway North
- Freshney Parkway LNR
- East Marsh Dockland
- Sweedale Croft Drain, and
- West Marsh Sidings

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
Oxides of Nitrogen	30	56.7	**1.1**	**3.6**	57.8	193
Sulphur dioxide	20	14	0.3	**1.5**	14.3	71
Ammonia	3	0.81	0.04	**1.3**	0.85	28
Hydrogen fluoride	5	-	0.05	**1**	-	-
Hydrogen fluoride	0.5	-	0.03	**6.7**	-	-

Note All the above concentration figures are in $\mu g/m^3$

PCs are considered **Insignificant** if:

- the **long-term** process contribution is less than **1%** of the relevant EQS/EAL; and
- the **short-term** process contribution is less than **10%** of the relevant EQS/EAL.

The **long term** 1% process contribution insignificance threshold is based on the judgements that:

- It is unlikely that an emission at this level will make a significant contribution to air quality;

- The threshold provides a substantial safety margin to protect health and the environment.

The **short term** 10% process contribution insignificance threshold is based on the judgements that:

- spatial and temporal conditions mean that short term process contributions are transient and limited in comparison with long term process contributions;
- the proposed threshold provides a substantial safety margin to protect health and the environment.

Table 1 above shows:-

Hydrogen Fluoride, the short term is at 1%, due to the conservative nature of the modelling we do not consider it necessary to carry out further assessment. Long term emissions screen out being under 10% .

Sulphur Dioxide, Nitrogen Dioxide and **Ammonia** do not screen out for the 1% long term insignificance level, and hence we are required to take into account the background contribution.

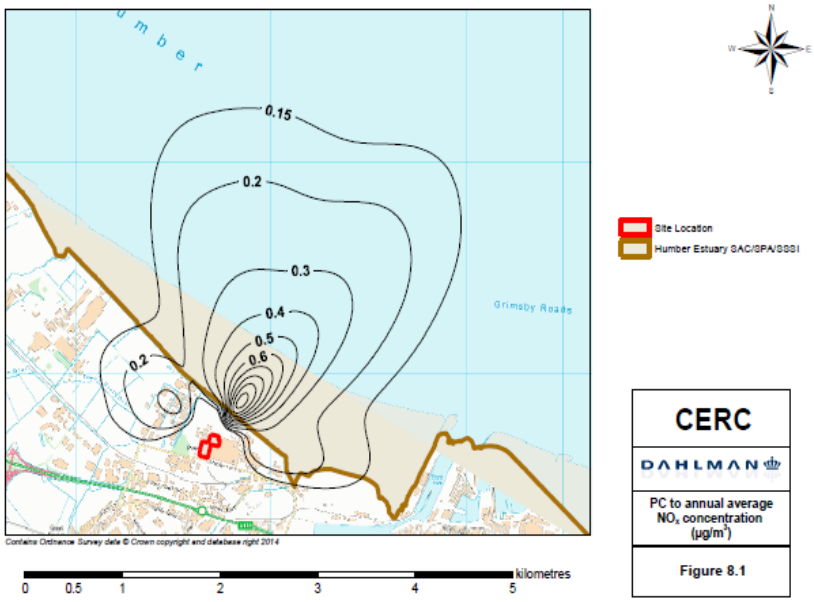
Looking at **Sulphur Dioxide** it can be seen that the PEC, as a percentage of the EAL, is 71%. This is only 1% above the normal threshold to require an in-combination assessment. However, the high level of Sulphur Dioxide can be attributed to the high background levels in the area. Based on the high background levels along with the conservative nature of the modelling, we consider that no further assessment is necessary and no likely significant effect from emissions of Sulphur Dioxide.

With respect to **Ammonia** the PEC as a percentage of the EAL is 28% which is significantly below the normal threshold of 70% to require an in-combination assessment. Therefore no further assessment is necessary and no likely significant effect from emissions of Ammonia.

With respect to **Nitrogen dioxide**, the modelled maximum point of impact at the Humber Estuary SAC, SPA and RAMSAR is NGR 525700, 411750, which is located within the interest feature described as ‘mud and sandflats not covered by seawater at low tide’. APIS data has confirmed that this interest feature is not sensitive to aerial emissions by virtue of the habitat being inundated twice daily by high tides, and therefore all exceedences noted within the modelling will not occur. This along with the conservative approach of the modelling means it is unlikely to cause a significant impact at this designated site and no further assessment is necessary.

With respect to Nitrogen Dioxide, Tioxide West Field LWS is the only non-statutory site of those listed above which is close to the modelled maximum point of impact. The maximum point of impact is in the Humber Estuary, mud and sandflats, NGR 525700, 411750. Figure 2 below, shows this maximum point of impact is not at Tioxide West Field which means it is unlikely to cause a significant impact at this site and no further assessment is necessary.

Figure shows NOx maximum point of impact on the Humber Estuary Mudflats.



5.5 Impact of abnormal operations

Article 50(4)(c) of IED requires that waste incineration and co-incineration plants shall operate an automatic system to prevent waste feed whenever any of the continuous emission monitors show that an emission limit value (ELV) is exceeded due to disturbances or failures of the purification devices. Notwithstanding this, Article 46(6) allows for the continued incineration and co-incineration of waste under such conditions provided that this period does not (in any circumstances) exceed 4 hours uninterrupted continuous operation or the cumulative period of operation does not exceed 60 hours in a calendar year. This is a recognition that the emissions during transient states (e.g. start-up and shut-down) are higher than during steady-state operation, and the overall environmental impact of continued operation with a limited exceedance of an ELV may be less than that of a partial shut-down and re-start.

For incineration plant, IED sets backstop limits for particulates, CO and TOC which must continue to be met at all times, even when the waste feed is stopped through the exceedence of an ELV or in the case of a breakdown. The CO and TOC limits are the same as for normal operation, and are intended to ensure that good combustion conditions are maintained. The backstop limit for particulates is 150 mg/m^3 (as a half hourly average) which is five times the limit in normal operation.

Article 45(1)(f) requires that the permit shall specify the maximum permissible period of any technically unavoidable stoppages, disturbances, or failures of the purification devices or the measurement devices, during which the concentrations in the discharges into the air may exceed the prescribed

emission limit values. In this case we have decided to set the time limit at 4 hours, which is the maximum period prescribed by Article 46(6).

Given that these abnormal operations are limited to no more than a period of 4 hours continuous operation and no more than 60 hour aggregated operation in any calendar year. This is less than 1% of total operating hours and so abnormal operating conditions are not expected to have any significant long term environmental impact unless the background conditions were already close to, or exceeding, an EQS. For the most part therefore consideration of abnormal operations is limited to consideration of its impact on short term EQSs.

In making an assessment of abnormal operations the following worst case scenario has been assumed:

- Dioxin emissions of 10 ng/m^3 (100 x normal[1])
- Mercury emissions are 100 times those of normal operation
- NO_x emissions of 3,200 mg/m^3 (8 x normal)
- Particulate emissions of 90 mg/m^3 (3 x normal)
- Metal emissions other than mercury are 5 times those of normal operation
- SO_2 emissions of 670 mg/m^3 (3.3 x normal)
- HCl emissions of 150 mg/m^3 (3 x normal)

Note 1 – where normal is the 1/2hourly average limit in the permit

The above accounts for the worst case scenario, which for this installation consists of the simultaneous operation of stack 1 (handling the Milena flue gas) with Flares 1 and 3 burning syngas. The operation of the flares will be limited to a maximum continuous period of no more than four hours and a cumulative total of 60 hours per annum. The emissions concentrations above are conservative in their nature, as it is difficult to predict abnormal circumstance. The operator has assumed that the emissions will be continuous throughout the year, to ensure all dispersion under all meteorological conditions are taken into account. This analysis assumes that any failure of any equipment results in all the negative impacts set out above occurring simultaneously.

The result on the Applicant's short-term environmental impact is summarised in the table below.

Pollutant	**EQS / EAL**		**Back-ground**	**Process Contribution (PC)**		**Predicted Environmental Concentration (PEC)**	
	µg/m^3		**µg/m^3**	**µg/m^3**	**% of EAL**	**µg/m^3**	**% of EAL**
NO_2	200	2	63	105	144.0	351	175.5
PM_{10}	50	3	33.6	31	62.00	64.6	129.2
SO_2	266	4	14	522	196.2	536	201.5
	350	5	14	505	144.29	519	148.3

HCl	750	6	0.3	33	4.4	33.3	4.44
HF	160	6		2.37	1.48125	2.37	1.5
Hg	7.5	1	0.000015	0.03	0.40	0.03002	0.400
Sb	150	1	0.00094	0.3	0.20	0.30094	0.201
Cu	200	1	0.0047	0.3	0.15	0.30470	0.152
Mn	1500	1	0.065	0.3	0.02	0.36500	0.0243
Cr (II)(III)	150	1	0.0048	0.3	0.20	0.30480	0.2032
Dioxins			0.000271	3.21 E+00		3.21E +00	

1	1-hr Maximum
2	99.79th %ile of 1-hour means
3	90.41st %ile of 24-hour means
4	99.9th ile of 15-min means
5	99.73rd %ile of 1-hour means
6	1-hour average

From the table above the emissions of the following substances can still be considered insignificant, in that the PC is still <10% of the short-term EQS/EAL: HCL, HF, Hg, Sb, Cu, Mn, Cr (II)(III).

Also from the table above emissions of the following emissions NO_x, PM_{10}, SO_2 which were not screened out as insignificant have been further assessed for impact at the nearest sensitive receptor.

Pollutant	**EQS/EAL**	**Back-ground**	**PC at nearest sensitive receptor**	**PC% of objective**	**Predicted Environ-mental Concentration (PEC)**	**PEC % of objective**
NO2	200	63	105	52.5	168	84
SO2	350	28	98	28	126	36
SO2	266	28	111	41.7	139	52.3
PM10	50	23.2	2.2	4.4	25.4	50.8

The above table shows the impacts at the nearest sensitive receptors as being unlikely to give rise to significant pollution in that the predicted environmental concentration at the nearest sensitive receptors is less than 100% of short term EQS/EAL.

We are therefore satisfied that it is not necessary to further constrain the conditions and duration of the periods of abnormal operation beyond those permitted under Chapter IV of the IED.

We have not assessed the impact of abnormal operations against long term EQSs for the reasons set out above. To assess whether there will be a significant increase in the impact of dioxins, during abnormal operations the Applicant has assessed the increase for a receptor exposed to the TDI.

Predicted dioxin intake rates for an adult from all pathways combined (pg WHO-TEQ kg^{-1} day^{-1}

	Condition	TDI for dioxins	Calculated daily intake of dioxins	% of TDI
Adult	Normal	2	0.024	1.2
Adult	Abnormal	2	0.052	2.6

In these circumstances the TDI would be 0.052 pg(I-TEQ/ kg-BW/day), which is 2.6% of the COT TDI. At this level, emissions of dioxins will still not pose a risk to human health.

5.6 Other Emissions

Noise

The operator submitted a noise assessment which was found on the whole to be reasonable by AQMAU however the Environment Agency whilst not agreeing with the exact numerical values, do agree with the assessments conclusions. The conclusions predicted that there could be noise impacts at two receptors over a level where complaints are likely. We have imposed a pre-operational condition PO8, as follows:-

Prior to the commencement of commissioning the Operator shall carry out a BS4142 noise assessment for the site in which:-

1. a background noise survey is undertaken and appropriate LA90 values established for each receptor for all times when the plant is intended to be operated. Note that this should include weekends and nights as well as weekdays. It should also ensure section 10 of BS4142 is followed precisely.
2. specific and rating levels are established by modelling. Reference should be made to https://www.gov.uk/government/publications/noise-impact-assessment-information-requirements prior to commencement of the predictions.

A full report of the above assessment should be submitted to the agency for approval, and should include if required a plan for the implementation of mitigation measures to mimimise the likelihood of complaints at sensitive receptors.

As this site is not yet built and all the predictions are based on plant yet to be purchased, the above pre-operational condition will give the Operator the opportunity to use mitigation measures where necessary to ensure the plant is operated in such a way activities shall be free from noise and vibration at levels likely to cause pollution outside the site.

Odour

The Operator assessed the risk of odour from the site. The process uses non-hazardous waste derived fuels such as clean wood biomass and RDF as fuel for a gasification process. The expected throughput from the facility is 53,600 tonnes per annum. There will be no more than 1,365 tonnes of waste stored on site at any one time. The RDF will arrive on site in sealed bales and be off-loaded via an automated offloading system and then segregated into storage areas. Clean wood biomass used for start-up will be brought on site via vehicles and be automatically offloaded and stored in a silo with capacity storage for 5 days operation. The silo will be designed to deal with carbon Monoxide (CO) build up and with appropriate signage. The storage facility will employ fast acting doors in the reception and bale store area, and the building will be maintained at a slightly negative pressure, drawing combustion air from the waste bunker areas and bale store areas through a dust and carbon filter during process shutdown. If the above measures are implemented it is unlikely odour emissions would be likely to cause pollution on site or beyond the boundary.

6. Application of Best Available Techniques

6.1 Scope of Consideration

In this section, we explain how we have determined whether the Applicant's proposals are the Best Available Techniques for this Installation.

- The first issue we address is the fundamental choice of incineration technology. There are a number of alternatives, and the Applicant has explained why it has chosen one particular kind for this Installation.

- We then consider in particular control measures for the emissions which were not screened out as insignificant in the previous section on minimising the installation's environmental impact.

- We also have to consider the combustion efficiency and energy utilisation of different design options for the Installation, which are relevant considerations in the determination of BAT for the Installation, including the Global Warming Potential of the different options.

- Finally, the prevention and minimisation of Persistent Organic Pollutants (POPs) must be considered, as we explain below.

Chapter IV of the IED specifies a set of maximum emission limit values. Although these limits are designed to be stringent, and to provide a high level of environmental protection, they do not necessarily reflect what can be achieved by new plant. Article 14(3) of the IED says that BAT conclusions shall be the reference for setting the permit conditions, so it may be possible and desirable to achieve emissions below the limits referenced in Chapter IV.

Even if the Chapter IV limits are appropriate, operational controls complement the emission limits and should generally result in emissions below the maximum allowed; whilst the limits themselves provide headroom to allow for unavoidable process fluctuations. Actual emissions are therefore almost certain to be below emission limits in practice, because any Operator who sought to operate its installation continually at the maximum permitted level would almost inevitably breach those limits regularly, simply by virtue of normal fluctuations in plant performance, resulting in enforcement action (including potentially prosecution) being taken. Assessments based on, say, Chapter IV limits are therefore "worst-case" scenarios.

Should the Installation, once in operation, emit at rates significantly below the limits included in the Permit, we will consider tightening ELVs appropriately. We are, however, satisfied that emissions at the permitted limits would ensure a high level of protection for human health and the environment in any event.

6.1.1 Consideration of Furnace Type

The prime function of the furnace is to achieve maximum combustion of the waste. Chapter IV of the IED requires that the plant (furnace in this context) should be designed to deliver its requirements. The main requirements of Chapter IV in relation to the choice of a furnace are compliance with air emission limits for CO and TOC and achieving a low TOC/LOI level in the bottom ash.

The Waste Incineration BREF elaborates the furnace selection criteria as:

- the use of a furnace (including secondary combustion chamber) dimensions that are large enough to provide for an effective combination of gas residence time and temperature such that combustion reactions may approach completion and result in low and stable CO and TOC emissions to air and low TOC in residues.
- use of a combination of furnace design, operation and waste throughput rate that provides sufficient agitation and residence time of the waste in the furnace at sufficiently high temperatures.
- The use of furnace design that, as far as possible, physically retain the waste within the combustion chamber (e.g. grate bar spacing) to allow its complete combustion.

The BREF also provides a comparison of combustion and thermal treatment technologies and factors affecting their applicability and operational suitability used in EU and for all types of wastes. There is also some information on the comparative costs. The table below has been extracted from the BREF tables. This table is also in line with the Guidance Note "The Incineration of Waste (EPR 5.01)). However, it should not be taken as an exhaustive list nor that all technologies listed have found equal application across Europe.

Overall, any of the furnace technologies listed below would be considered as BAT provided the Applicant has justified it in terms of:

- nature/physical state of the waste and its variability

- proposed plant throughput which may affect the number of incineration lines
- preference and experience of chosen technology including plant availability
- nature and quantity/quality of residues produced.
- emissions to air – usually NOx as the furnace choice could have an effect on the amount of unabated NOx produced
- energy consumption – whole plant, waste preparation, effect on GWP
- need, if any, for further processing of residues to comply with TOC
- costs

Summary comparison of thermal treatment technologies (reproduced from the Waste Incineration BREF)

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Moving grate (air-cooled)	Low to medium heat values (LCV 5 – 16.5 GJ/t) Municipal and other heterogeneous solid wastes Can accept a proportion of sewage sludge and/or medical waste with municipal waste Applied at most modern MSW installations	1 to 50 t/h with most projects 5 to 30 t/h. Most industrial applications not below 2.5 or 3 t/h.	Widely proven at large scales. Robust Low maintenance cost Long operational history Can take heterogeneous wastes without special preparation	Generally not suited to powders, liquids or materials that melt through the grate	TOC 0.5 % to 3 %	High capacity reduces specific cost per tonne of waste
Moving grate (liquid Cooled)	Same as air-cooled grates except: LCV 10 – 20 GJ/t	Same as air-cooled grates	As air-cooled grates but: - higher heat value waste treatable better combustion control possible.	As air-cooled grates but: risk of grate damaging leaks and higher complexity	TOC 0.5 % to 3 %	Slightly higher capital cost than air-cooled

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Rotary Kiln	Can accept liquids and pastes Solid feeds more limited than grate (owing to refractory damage) Often applied to hazardous wastes	<10 t/h	Very well proven with broad range of wastes and good burn out even of HW	Throughputs lower than grates	TOC <3 %	Higher specific cost due to reduced capacity
Fluid bed - bubbling	Only finely divided consistent wastes. Limited use for raw MSW Often applied to sludges	1 to 10 t/h	Good mixing Fly ashes of good leaching quality	Careful operation required to avoid clogging bed. Higher fly ash quantities.	TOC <3 %	FGT cost may be lower. Costs of waste preparation
Fluid bed - circulating	Only finely divided consistent wastes. Limited use for raw MSW, often applied to sludges / RDF.	1 to 20 t/h most used above 10 t/h	Greater fuel flexibility than BFB Fly ashes of good leaching quality	Cyclone required to conserve bed material Higher fly ash quantities	TOC <3 %	FGT cost may be lower. Costs of preparation.
Oscillating furnace	MSW / heterogeneous wastes	1 – 10 t/h	Robust Low maintenance Long history Low NOX level Low LOI of bottom ash	Higher thermal loss than with grate furnace LCV under 15 GJ/t	TOC 0.5 – 3 %	Similar to other technologies

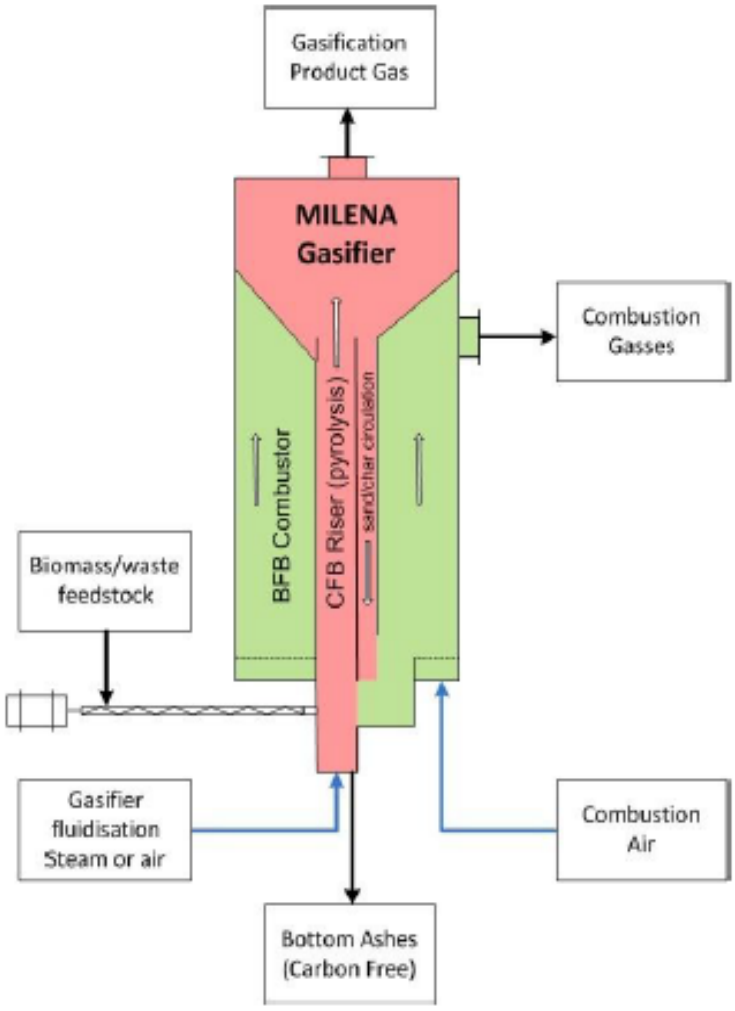
Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Pulsed hearth	Only higher CV waste (LCV >20 GJ/t) Mainly used for clinical wastes	<7 t/h	Can deal with liquids and powders	Bed agitation may be lower	Dependent on waste type	Higher specific cost due to reduced capacity
Stepped and static hearths	Only higher CV waste (LCV >20 GJ/t) Mainly used for clinical wastes	No information	Can deal with liquids and powders	Bed agitation may be lower	Dependent on waste type	Higher specific cost due to reduced capacity
Spreader - stoker combustor	RDF and other particle feeds - Poultry manure - Wood wastes	No information	Simple grate construction Less sensitive to particle size than FB	Only for well defined mono-streams	No information	No information
Gasification - fixed bed	Mixed plastic wastes Other similar consistent streams Gasification less widely used/proven than incineration	1 to 20 t/h	Low leaching residue Good burnout if oxygen blown Syngas available Reduced oxidation of recyclable metals	Limited waste feed Not full combustion High skill level Tar in raw gas Less widely proven	Low leaching bottom ash Good burnout with oxygen	High operation/ maintenance costs

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Gasification - entrained flow	Mixed plastic wastes Other similar consistent streams Not suited to untreated MSW Gasification less widely used/proven than incineration	To 10 t/h	Low leaching slag Reduced oxidation of recyclable metals	Limited waste feed Not full combustion High skill level Less widely proven	Low leaching slag	High operation/ maintenance costs Pre-treatment costs high
Gasification - fluid bed	Mixed plastic wastes - shredded MSW - shredder residues - sludges - metal rich wastes - other similar consistent streams Less widely used/proven than incineration	5 – 20 t/h	Temperatures e.g. for Al recovery Separation of non-combustibles Can be combined with ash melting Reduced oxidation of recyclable metals	Limited waste size (<30cm) Tar in raw gas Higher UHV raw gas Less widely proven	If Combined with ash melting chamber ash is vitrified	Lower than other gasifiers
Pyrolysis	Pre-treated MSW High metal inert streams Shredder residues/plastics Pyrolysis is less widely used/proven than incineration	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	No oxidation of metals No combustion energy for metals/inert In reactor acid neutralisation possible Syngas available	Limited wastes Process control & engineering critical High skill required Not widely proven Market for syngas	Dependent on process temperature Residue produced requires further processing e.g. combustion	High pre-treatment, operation and capital costs

The Applicant has carried out a review of the following candidate furnace types:

- Moving Grate Furnace
- Rotary Kiln
- Fluidised Bed
- Pyrolysis / Gasification

While the Operator found similarities in some areas of the reviewed technology (GWP, odour, costs etc.) the applicant has proposed to use an indirect fluidised bed furnace gasifier; (MILENA) where it is predicted 90-95% carbon conversion is achieved within the pyrolysis zone. However, unlike conventional gasifiers, the remaining 5-10% carbon, together with ash and bed material, is sent to the combustion section directly via the internal down comer. Ash and tar captured by the cyclones and the oil and gas removal (OLGA) system is also sent to the combustion section of the MILENA. The resultant gas is used to fuel a gas turbine and a Heat Recovery Steam Generator giving a 25-35% energy efficiency, this is higher than the other candidate furnaces. (Figure below shows a simplified version of the indirect gasification unit).



All of the above are identified in the tables above as being considered BAT in the BREF or TGN for this type of waste feed.

The Applicant proposes to use natural gas as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on the available local supply. There is a natural gas terminal on site which the applicant can use to connect to the supply. Natural gas is a low sulphur fuel and its use on site will be restricted to 85 tonnes/year.

Derogation from Operational Parameters

Paragraphs 4.31 to 4.36 of the DEFRA EPR WID Guidance (version 3.1) describe the requirements for derogation of the combustion chamber temperature (minimum 850^{O}C) and residence time (minimum 2 seconds) requirements of Article 50(2) of the IED.

The gas engines are incapable themselves of delivering this residence time, due to the nature of engine operation. This is common to all gasification processes which employ gas turbines or engines to combust the syngas produced. The combustion takes place at very high temperatures over very short periods of time. Therefore derogation of the requirements of Article 50(2) is authorised under Article 51(1) of the IED.

There is no derogation for TOC emission levels; other emission limits, specified under IED, are not compromised; residues are not produced in greater quantities or lower quality as the result of the derogation for temperature and residence time.

Boiler Design

In accordance with our Technical Guidance Note, S5.01, the Applicant has confirmed that the boiler design will include the following features to minimise the potential for reformation of dioxins within the de-novo synthesis range:

- ensuring that the steam/metal heat transfer surface temperature is a minimum where the exhaust gases are within the de-novo synthesis range;
- design of the boilers using CFD to ensure no pockets of stagnant or low velocity gas;
- boiler passes are progressively decreased in volume so that the gas velocity increases through the boiler; and
- design of boiler surfaces to prevent boundary layers of slow moving gas.

We have considered the assessments made by the Applicant and agree that the furnace technology chosen represents BAT. We believe that, based on the information gathered by the BREF process, the chosen technology will achieve the requirements of Chapter IV of the IED for the air emission of TOC/CO and the TOC on bottom ash.

6.2 BAT and emissions control

The prime function of flue gas treatment is to reduce the concentration of pollutants in the exhaust gas as far as practicable. The techniques which are described as BAT individually are targeted to remove specific pollutants, but the BREF notes that there is benefit from considering the FGT system as a whole unit. Individual units often interact, providing a primary abatement for some pollutants and an additional effect on others.

The BREF lists the general factors requiring consideration when selecting flue-gas treatment (FGT) systems as:

- type of waste, its composition and variation
- type of combustion process, and its size
- flue-gas flow and temperature
- flue-gas content, size and rate of fluctuations in composition
- target emission limit values
- restrictions on discharge of aqueous effluents
- plume visibility requirements
- land and space availability
- availability and cost of outlets for residues accumulated/recovered
- compatibility with any existing process components (existing plants)
- availability and cost of water and other reagents
- energy supply possibilities (e.g. supply of heat from condensing scrubbers)
- reduction of emissions by primary methods
- release of noise.

Taking these factors into account the Technical Guidance Note points to a range of technologies being BAT subject to circumstances of the Installation.

6.2.1 Particulate Matter

Particulate matter				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Bag / Fabric filters (BF)	Reliable abatement of particulate matter to below 5mg/m^3	Max temp 250°C	Multiple compartments Bag burst detectors	Most plants
Wet scrubbing	May reduce acid gases simultaneously.	Not normally BAT. Liquid effluent produced	Require reheat to prevent visible plume and dew point problems.	Where scrubbing required for other pollutants
Ceramic filters	High temperature applications	May “blind” more than fabric filters		Small plant. High

	Smaller plant.			temperature gas cleaning required.
Electrostatic precipitators	Low pressure gradient. Use with BF may reduce the energy consumption of the induced draft fan.	Not normally BAT.		When used with other particulate abatement plant

The Applicant proposes to use fabric filters for the abatement of particulate matter. Fabric filters provide reliable abatement of particulate matter to below 5 mg/m^3 and are BAT for most installations. The Applicant proposes to use multiple compartment filters with burst bag detection to minimise the risk of increased particulate emissions in the event of bag rupture.

Emissions of particulate matter have been previously assessed as insignificant, and so the Environment Agency agrees that the Applicant's proposed technique is BAT for the installation.

6.2.2 Oxides of Nitrogen

Oxides of Nitrogen : Primary Measures				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Low NOx burners	Reduces NOx at source		Start-up, supplementary firing.	Where auxiliary burners required.
Starved air systems	Reduce CO simultaneously.			Pyrolysis, Gasification systems.
Optimise primary and secondary air injection				All plant.
Flue Gas Recirculation (FGR)	Reduces the consumption of reagents used for secondary NOx control. May increase overall energy recovery	Some applications experience corrosion problems.		All plant unless impractical in design (needs to be demonstrated)

Oxides of Nitrogen : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Selective catalytic reduction (SCR)	NOx emissions < 70mg/ m^3 Reduces CO, VOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
Selective non-catalytic reduction (SNCR)	NOx emissions typically 150 - 180mg/m^3	Relies on an optimum temperature around 900 °C, and sufficient retention time for reduction May lead to Ammonia slip	Port injection location	All plant unless lower NOx release required for local environmental protection.
Reagent Type: Ammonia	Likely to be BAT Lower nitrous oxide formation	More difficult to handle Narrower temperature window		All plant
Reagent Type: Urea	Likely to be BAT			All plant

The Applicant proposes to implement the following primary measures:

- Low NO_x burners – this technique reduces NO_x at source and is defined as BAT where auxiliary burners are required.
- Optimise primary and secondary air injection – this technique is BAT for all plant.
- Flue gas recirculation – this technique reduces the consumption of reagents for secondary NO_x control and can increase overall energy recovery. Although in some applications there can be corrosion problems the technique is considered BAT for all plant. The Grimsby plant will have no FGR due to complexity; it will be using 10-20% secondary air as BAT.

There are two recognised techniques for secondary measures to reduce NO_x. These are Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR). For each technique, there is a choice of urea or ammonia reagent.

SCR can reduce NO_x levels to below 70 mg/m^3 and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency, periodic replacement of

the catalysts also produces a hazardous waste. SNCR can typically reduce NO_x levels to between 150 and 180 mg/m^3, it relies on an optimum temperature of around 900 deg C and sufficient retention time for reduction. SNCR is more likely to have higher levels of ammonia slip. The technique can be applied to all plant unless lower NO_x releases are required for local environmental protection. Urea or ammonia can be used as the reagent with either technique, urea is somewhat easier to handle than ammonia and has a wider operating temperature window, but tends to result in higher emissions of N_2O. Either reagent is BAT, and the use of one over the other is not normally significant in environmental terms.

With respect to stack 1 from the combuster side of the Milena in-direct gasification unit, the applicant is using primary measures to minimise NO_x, as predicted emissions are low due it burning only the solid residues from the gasification process. With respect to stack 3 from the gas turbine the applicant proposes to use SCR with ammonia as the reagent.

Emissions of NO_x from both stacks 1 & 3 have previously been assessed as insignificant at the nearest sensitive feature and so the Environment Agency agrees that the Applicant's proposed technique is BAT for the installation.

The amount of ammonia used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH_3 slip. Improvement condition IC5 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system. The Operator is also required to monitor and report on NH_3 and N_2O emissions every 6 months.

6.2.3 Acid Gases, SO_x, HCl and HF

Acid gases and halogens : Primary Measures				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Low sulphur fuel, (< 0.1%S gasoil or natural gas)	Reduces SOx at source		Start-up, supplementary firing.	Where auxiliary fuel required.
Management of waste streams	Disperses sources of acid gases (e.g. PVC) through feed.	Requires closer control of waste management		All plant with heterogeneous waste feed

Acid gases and halogens : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**

Wet	High reaction rates Low solid residues production Reagent delivery may be optimised by concentration and flow rate	Large effluent disposal and water consumption if not fully treated for re-cycle Effluent treatment plant required May result in wet plume Energy required for effluent treatment and plume reheat		Plants with high acid gas and metal components in exhaust gas – HWIs
Dry	Low water use Reagent consumption may be reduced by recycling in plant Lower energy use Higher reliability	Higher solid residue production Reagent consumption controlled only by input rate		All plant
Semi-dry	Medium reaction rates Reagent delivery may be varied by concentration and input rate	Higher solid waste residues		All plant
Reagent Type: Sodium Hydroxide	Highest removal rates Low solid waste production	Corrosive material ETP sludge for disposal		HWIs
Reagent	Very good	Corrosive	Wide range	MWIs, CWIs

Type: Lime	removal rates Low leaching solid residue Temperature of reaction well suited to use with bag filters	material May give greater residue volume if no in-plant recycle	of uses	
Reagent Type: Sodium Bicarbonate	Good removal rates Easiest to handle Dry recycle systems proven	Efficient temperature range may be at upper end for use with bag filters – Leachable solid residues Bicarbonate more expensive	Not proven at large plant	CWIs

The Applicant proposes to implement the following primary measures:

- Use of low sulphur fuels for start up and auxiliary burners – gas should be used if available, where fuel oil is used, this will be low sulphur (i.e. <0.1%), this will reduce SO_x at source. The Applicant has justified its choice of natural gas as the support fuel on the basis that it is naturally low in sulphur and readily available locally and we agree with that assessment.
- Management of heterogeneous wastes – this will disperse problem wastes such as PVC by ensuring a homogeneous waste feed.

There are three recognised techniques for secondary measures to reduce acid gases. These are wet, dry and semi-dry. Wet scrubbing produces an effluent for treatment and disposal in compliance with Article 46(3) of IED. It will also require reheat of the exhaust to avoid a visible plume. Wet scrubbing is unlikely to be BAT except where there are high acid gas and metal components in the exhaust gas as may be the case for some hazardous waste incinerators. In the case of stack 1 & 3 the Applicant proposes using dry scrubbing, and the Environment Agency agrees that dry scrubbing is appropriate in this case.

The Applicant has therefore considered dry and semi-dry methods of secondary measures for acid gas abatement. Either can be BAT for this type of facility.

Both dry and semi-dry methods rely on the dosing of powdered materials into the exhaust gas stream. Semi-dry systems (i.e. hydrated reagent) offer reduced material consumption through faster reaction rates, but reagent recycling in dry systems can offset this.

In both dry and semi-dry systems, the injected powdered reagent reacts with the acid gases and is removed from the gas stream by the bag filter system. The powdered materials are either lime or sodium bicarbonate. Both are effective at reducing acid gases, and dosing rates can be controlled from continuously monitoring acid gas emissions. The decision on which reagent to use is normally economic. Lime produces a lower leaching solid residue in the APC residues than sodium bicarbonate and the reaction temperature is well suited to bag filters, it tends to be lower cost, but it is a corrosive material and can generate a greater volume of solid waste residues than sodium bicarbonate. Either reagent is BAT, and the use of one over the other is not significant in environmental terms in this case.

As this installation has different requirements in stack 1 and stack 3 the Operator will be utilising dry scrubbing. Reagents will be dosed using an automated control system in order to optimise usage and minimise waste. The Environment Agency is satisfied that this is BAT.

6.2.4 Carbon monoxide and volatile organic compounds (VOCs)

The prevention and minimisation of emissions of carbon monoxide and volatile organic compounds is through the optimisation of combustion controls, where all measures will increase the oxidation of these species.

Carbon monoxide and volatile organic compounds (VOCs)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Optimise combustion control	All measures will increase oxidation of these species.		Covered in section on furnace selection	All plants

6.2.5 Dioxins and furans (and Other POPs)

Dioxins and furans				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Optimise combustion control	All measures will increase oxidation of these species.		Covered in section on furnace selection	All plants

Avoid *de novo* synthesis			Covered in boiler design	All plant
Effective Particulate matter removal			Covered in section on particulate matter	All plant
Activated Carbon injection	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.

The prevention and minimisation of emissions of dioxins and furans is achieved through:

- optimisation of combustion control including the maintenance of permit conditions on combustion temperature and residence time, which has been considered in 6.1.1 above;
- avoidance of de novo synthesis, which has been covered in the consideration of boiler design;
- the effective removal of particulate matter, which has been considered in 6.2.1 above;
- injection of activated carbon. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant. Effective control of acid gas emissions also assists in the control of dioxin releases.

In this case the Applicant proposes combined feed. The mixture of limestone and activated carbon (in the form of pellets) will be injected simultaneously into the flue gas filter. Separate injection would not be beneficial as the amount of activated carbon is that low that the particles themselves would not have sufficient activity on their own (the limestone improves by impact the effectiveness of the activated carbon). We are satisfied the Applicant's proposals are BAT.

6.2.6 Metals

Metals				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Effective Particulate			Covered in section on	All plant

matter removal			particulate matter	
Activated Carbon injection for mercury recovery	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.

The prevention and minimisation of metal emissions is achieved through the effective removal of particulate matter, and this has been considered in 6.2.1 above.

Unlike other metals however, mercury if present will be in the vapour phase. BAT for mercury removal is also dosing of activated carbon into the exhaust gas stream. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant.

The Applicant has justified combined feed on the ground that in this case the Applicant proposes combined feed. The mixture of limestone and activated carbon (in the form of pellets) will be injected simultaneously into the flue gas filter. Separate injection would not be beneficial as the amount of activated carbon is that low that the particles themselves would not have sufficient activity on their own (the limestone improves by impact the effectiveness of the activated carbon). We are satisfied the Applicant's proposals are BAT.

6.3 BAT and global warming potential

This section summarises the assessment of greenhouse gas impacts which has been made in the determination of this Permit. Emissions of carbon dioxide (CO_2) and other greenhouse gases differ from those of other pollutants in that, except at gross levels, they have no localised environmental impact. Their impact is at a global level and in terms of climate change. Nonetheless, CO_2 is clearly a pollutant for IED purposes.

The principal greenhouse gas emitted is CO_2, but the plant also emits small amounts of N_2O arising from the operation of secondary NO_x abatement. N_2O has a global warming potential 310 times that of CO_2. The Applicant will therefore be required to optimise the performance of the secondary NO_x abatement system to ensure its GWP impact is minimised.

The major source of greenhouse gas emissions from the installation is however CO_2 from the combustion of waste. There will also be CO_2

emissions from the burning of support fuels at start up, shut down and should it be necessary to maintain combustion temperatures. BAT for greenhouse gas emissions is to maximise energy recovery and efficiency.

The electricity that is generated by the Installation will displace emissions of CO_2 elsewhere in the UK, as virgin fossil fuels will not be burnt to create the same electricity. The Applicant has therefore included within its GWP calculations a CO_2 offset for the net amount of electricity exported from the Installation.

Grimsby RPF Global Warming Potential

Parameter	GWP (tonnes CO_2 equivalent per annum)		Calculations
	Released	Saving/offset	
Direct CO_2 emissions (auxiliary fuel)	241		85te/annum X 53.6GJ/Te = 4556 GJ of natural gas 4556 GJ x 0.0528 teCO2 per GJ
Direct CO_2 emissions (imported electricity)	259		650MWh per annum x 2.4 x 0.166
CO_2 emissions from the process	21,273		Based on normal operation of 7,000hrs from Stack 1 and Stack 3. Stack 1 mass flow of CO_2 1,762kg/hr Stack 3 mass flow of CO_2 4,316kg/hr Total = 6,078kg/hr 42,546te/annum 50% of RDF falls within the definition of Biomass therefore 42,546 x 50%= 21,273
N_2O from the process	390		1.26te/annum x 310 (CO_2) equivalent)
Total released	**21,773**		
Energy recovered (electricity)		16,922	CO_2 factor = 21,273te/annum/61,600MWh = 0.345te/MWh Energy Recovered 49,000MWh x 0.345te/MWh
Energy recovered (heat)		0	Heat recovered is used to increase the production of electricity. No end user for 3.5MW of 'useable' waste heat.
Total offset		**16,922**	
Net GWP	**4,851**		

Taking this into account, the net emissions of CO_2 from the installation are estimated at 4,851 tonnes per annum. At this level emissions cannot be characterised as insignificant. The Installation is not subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2003; therefore it is a requirement of IED to investigate how emissions of greenhouse gases emitted from the installation might be prevented or minimised.

The Applicant has considered GWP as part of its BAT options appraisal. There are a number of areas in which a difference can be made to the GWP of the Installation, e.g. The Applicant's BAT options appraisal compared SCR and SNCR methods of secondary NO_x abatement. In summary: the following factors influence the GWP of the facility:-
On the debit side

- CO_2 emissions from the burning of the waste;
- CO_2 emissions from burning auxiliary or supplementary fuels;

- CO_2 emissions associated with electrical energy used;
- N_2O from the de-NOx process.

On the credit side

- CO_2 saved from the export of electricity to the public supply by displacement of burning of virgin fuels;

Note: avoidance of methane which would be formed if the waste was landfilled has not been included in this assessment. If it were included due to its avoidance it would be included on the credit side. Ammonia has no direct GWP effect.

The Applicant's assessment shows that the GWP of the plant is dominated by the emissions of carbon dioxide that are released as a result of waste combustion. This is constant for all options considered in the BAT assessment.

The differences in the GWP of the options in the BAT appraisal arise from small differences in energy recovery and in the amount of N_2O emitted.

	Gas Treatment Technology Options	Predicted GWP (energy + emission contributions)	Best Option	Preferred Option
NOx abatement	SCR (ammonia)	844	844	844
	SNCR (ammonia)	2,220		
	SNCR (urea)	4,990		
Acid gas abatement	Wet (NaOH)	7	5	7(1)
	Wet (CaO)	7		
	Wet (CaOH)	7		
	Semi/Dry (CaOH)	5		
	Dry ($NaHCO_3$)	45		
	Dry (CaOH)	5		5(2)
Total GWP te$CO_{2(}$e)			**849**	**856**

Notes Indirect embedded Carbon cost of production of reagents etc are excluded

(1) Wet Scrubbing is used on syngas prior to combustion in CCGT and is integrated into water condenser, hence preference for wet system see BAT document.

(2) Injected into flue gas from MILENA Gasifier.

Taking all these factors into account, the Operator's assessment shows their preferred option is best in terms of GWP.

The Environment Agency agrees with this assessment and that the chosen option is BAT for the installation.

6.4 BAT and POPs

International action on Persistent Organic pollutants (POPs) is required under the UN's Stockholm Convention, which entered into force in 2004. The EU implemented the Convention through the POPs Regulation (850/2004), which is directly applicable in UK law. The Environment Agency is required by national POPs Regulations (SI 2007 No 3106) to give effect to Article 6(3) of the EC POPs Regulation when determining applications for environmental Permits.

However, it needs to be borne in mind that this application is for a particular type of installation, namely a waste incinerator. The Stockholm Convention distinguishes between intentionally-produced and unintentionally-produced POPs. Intentionally-produced POPs are those used deliberately (mainly in the past) in agriculture (primarily as pesticides) and industry. Those intentionally-produced POPs are not relevant where waste incineration is concerned, as in fact high-temperature incineration is one of the prescribed methods for destroying POPs.

The unintentionally-produced POPs addressed by the Convention are:

- dioxins and furans;
- HCB (hexachlorobenzene)
- PCBs (polychlorobiphenyls) and
- PeCB (pentachlorobenzene)

The UK's national implementation plan for the Stockholm Convention, published in 2007, makes explicit that the relevant controls for unintentionally-produced POPs, such as might be produced by waste incineration, are delivered through the requirements of IED. That would include an examination of BAT, including potential alternative techniques, with a view to preventing or minimising harmful emissions. These have been applied as explained in this document, which explicitly addresses alternative techniques and BAT for the minimisation of emissions of dioxins.

Our legal obligation, under regulation 4(b) of the POPs Regulations, is, when considering an application for an environmental permit, to comply with article 6(3) of the POPs Regulation:

> "Member States shall, when considering proposals to construct new facilities or significantly to modify existing facilities using processes that release chemicals listed in Annex III, without prejudice to Council Directive 1996/61/EC, give priority consideration to alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of substances listed in Annex III."

The 1998 Protocol to the Convention recommended that unintentionally produced should be controlled by imposing emission limits (e.g 0.1 ng/m^3 for MWIs) and using BAT for incineration. UN Economic Commission for Europe (Executive Body for the Convention) (ECE-EB) produced BAT guidance for the parties to the Convention in 2009. This document considers various

control techniques and concludes that primary measures involving management of feed material by reducing halogenated substances are not technically effective. This is not surprising because halogenated wastes still need to be disposed of and because POPs can be generated from relatively low concentrations of halogens. In summary, the successful control techniques for waste incinerators listed in the ECE-EB BAT are:

- maintaining furnace temperature of 850^{o}C and a combustion gas residence time of at least 2 seconds
- rapid cooling of flue gases to avoid the *de novo* reformation temperature range of 250-450^{o}C
- use of bag filters and the injection of activated carbon or coke to adsorb residual POPs components.

Using the methods listed above, the UN-ECE BAT document concludes that incinerators can achieve an emission concentration of 0.1 ng TEQ/m^{3}.

We believe that the Permit ensures that the formation and release of POPs will be prevented or minimised. As we explain above, high-temperature incineration is one of the prescribed methods for destroying POPs. Permit conditions are based on the use of BAT and Chapter IV of IED and incorporate all the above requirements of the UN-ECE BAT guidance and deliver the requirements of the Stockholm Convention in relation to unintentionally produced POPs.

The release of **dioxins and furans** to air is required by the IED to be assessed against the I-TEQ (International Toxic Equivalent) limit of 0.1 ng/m^{3}. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. EPR requires that, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be specified for monitoring and reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. EPR requires monitoring of a range of PAHs and dioxin-like PCBs in waste incineration Permits at the same frequency as dioxins are monitored. We have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like PCBs and the range of PAHs identified by Defra in the Environmental Permitting Guidance on the IED. We are confident that the measures taken to control the release of dioxins will also control the releases of dioxin-like PCBs and PAHs. Section 5 of this document details the assessment of emissions to air, which includes dioxins and concludes that

there will be no adverse effect on human health from either normal or abnormal operation.

Hexachlorobenzene (HCB) is released into the atmosphere as an accidental product from the combustion of coal, waste incineration and certain metal processes. It has also been used as a fungicide, especially for seed treatment although this use has been banned in the UK since 1975. Natural fires and volcanoes may serve as natural sources. Releases of (HCB) are addressed by the European Environment Agency (EEA), which advises that:

> "*due to comparatively low levels in emissions from most (combustion) processes special measures for HCB control are usually not proposed. HCB emissions can be controlled generally like other chlorinated organic compounds in emissions, for instance dioxins/furans and PCBs: regulation of time of combustion, combustion temperature, temperature in cleaning devices, sorbents application for waste gases cleaning etc*." [reference http://www.eea.europa.eu/publications/EMEPCORINAIR4/sources_of_HCB.pdf]

Pentachlorobenzene (PeCB) is another of the POPs list to be considered under incineration. PeCB has been used as a fungicide or flame retardant, there is no data available however on production, recent or past, outside the UN-ECE region. PeCBs can be emitted from the same sources as for PCDD/F: waste incineration, thermal metallurgic processes and combustion plants providing energy. As discussed above, the control techniques described in the UN-ECE BAT guidance and included in the permit, are effective in controlling the emissions of all relevant POPs including PeCB.

We have assessed the control techniques proposed for dioxins by the Applicant and have concluded that they are appropriate for dioxin control. We are confident that these controls are in line with the UN-ECE BAT guidance and will minimise the release of HCB, PCB and PeCB.

We are therefore satisfied that the substantive requirements of the Convention and the POPs Regulation have been addressed and complied with.

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

Surface runoff (storm) water will be discharged via attenuation storage with oil interceptor and sediment collection to Mambridge drain system outside the site premises.

Based upon the information in the application we are satisfied that appropriate measures will be in place to prevent and /or minimise emissions to water.

6.5.2 Emissions to sewer

The applicant applied and has been granted a discharge consent to sewer. All process effluent will be directed to sewer in line with their discharge consent.

Based upon the information in the application we are satisfied that appropriate measures will be in place to prevent and /or minimise emissions to sewer.

6.5.3 Fugitive emissions

The IED specifies that plants must be able to demonstrate that the plant is designed in such a way as to prevent the unauthorised and accidental release of polluting substances into soil, surface water and groundwater. In addition storage requirements for waste and for contaminated water of Article 46(5) must be arranged.

The Installation will be designed to prevent potential fugitive emissions to water other than possible groundwater infiltration of clean surface water runoff. Secondary containment, interceptors, catch pots and continuous leakage detection and an inspection and maintenance programme will be implemented as appropriate.

Detailed design will confirm the volume of storage that is required to contain fire water from a typical fire event and to ensure that sufficient containment is provided to ensure that the fire fighting waters can be isolated, tested, and if necessary treated before discharge, in accordance with Article 46 of the IED.

Based upon the information in the application we are satisfied that appropriate measures will be in place to prevent and /or minimise fugitive emissions.

6.5.4 Odour

See section 5.6

6.5.5 Noise and vibration

See section 5.6

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

Article 14(3) of IED states that BAT conclusions shall be the reference for permit conditions. Article 15(3) further requires that under normal operating conditions; emissions do not exceed the emission levels associated with the best available techniques as laid down in the decisions on BAT conclusions.

At the time of writing of this document, no BAT conclusions have been published for waste incineration or co-incineration.

The use of IED Chapter IV emission limits for air dispersion modelling sets the worst case scenario. If this shows emissions are insignificant then we have accepted that the Applicant's proposals are BAT, and that there is no justification to reduce ELVs below the Chapter IV limits in these circumstances.

Below we consider whether, for those emission not screened out as insignificant, different conditions are required as a result of consideration of local or other factors, so that no significant pollution is caused (Article 11(c)) or to comply with environmental quality standards (Article 18).

(i) Local factors

We have considered the impact on local receptors and habitat conservation sites for those emissions not screened out as insignificant and do not consider it necessary to impose further conditions, or set more stringent emission limits than those specified.

(ii) National and European EQSs

There are no additional National or European EQSs that indicate that IED limits are insufficient to protect the local environment.

(iii) Global Warming

CO_2 is an inevitable product of the combustion of waste. The amount of CO_2 emitted will be essentially determined by the quantity and characteristics of waste being incinerated, which are already subject to conditions in the Permit. It is therefore inappropriate to set an emission limit value for CO_2, which could do no more than recognise what is going to be emitted. The gas is not therefore targeted as a key pollutant under Annex II of IED, which lists the main polluting substances that are to be considered when setting emission limit values (ELVs) in Permits.

We have therefore considered setting equivalent parameters or technical measures for CO_2. However, provided energy is recovered efficiently (see section 4.3.7 above), there are no additional equivalent technical measures (beyond those relating to the quantity and characteristics of the waste) that can be imposed that do not run counter to the primary purpose of the plant, which is the recovery of energy from waste. Controls in the form of restrictions on the volume and type of waste that can be accepted at the Installation and permit conditions relating to energy efficiency effectively apply equivalent technical measures to limit CO_2 emissions.

(iv) Commissioning

Before the plant can become fully operational it will be necessary for it to be commissioned. Before commissioning can commence the Operator is required by pre-operational condition PO4 to submit a commissioning plan to

the Agency for approval. Commissioning can only begin and be carried out in accordance with the approved proposals in the plan.

In addition, it is recognised that as certain information presented in the Application was based on design data, or data from comparable equipment, the commissioning phase is the earliest opportunity to verify much of this information. The following improvement conditions have been included in the permit so that appropriate verifications will be determined by the Applicant:

- Calibration of CEMs in accordance with BS EN 14181 (IC6).
- Verification of furnace residence time, temperature and oxygen content (IC4).
- The plant in total conforms to the permit conditions and that satisfactory process control procedures for the plant have been developed (IC3).
- Abatement plant optimisation details (IC5).

6.7 Monitoring

6.7.1 Monitoring during normal operations

We have decided that monitoring should be carried out for the parameters listed in Schedule 3 using the methods and to the frequencies specified in those tables. These monitoring requirements have been imposed in order to demonstrate compliance with emission limit values and to enable correction of measured concentration of substances to the appropriate reference conditions; to gather information about the performance of the SCR system; to deliver the EPR requirement that dioxin-like PCBs and PAHs should be monitored and to deliver the requirements of Chapter IV of IED for monitoring of residues and temperature in the combustion chamber.

For emissions to air, the methods for continuous and periodic monitoring are in accordance with the Environment Agency's Guidance M2 for monitoring of stack emissions to air.

For emissions to water, the methods for continuous monitoring are in accordance with the environment Agency's Guidance M18 for monitoring of discharges to water and sewer.

Based on the information in the Application and the requirements set in the conditions of the permit we are satisfied that the Operator's techniques, personnel and equipment will have either MCERTS certification or MCERTS accreditation as appropriate.

6.7.2 Monitoring under abnormal operations arising from the failure of the installed CEMs

The Operator has not yet decided whether to install back-up CEMS to work in parallel to the operating CEMS. In the event that they do not install back-up CEMS the operator proposes to use a manual analysis campaign to

demonstrate compliance with the emission limit values for particulates, TOC and or CO. The Operator intends to assess the need for back-up CEMS following the completion of the commissioning phase. A contract with the CEMS supplier will be arranged to include an emergency 24 hour repair service and sufficient spare parts will be kept onsite to repair or replace a malfunctioning unit. In the unlikely event that the Operator is unable to repair/replace CEMS or the back-up CEM fail Condition 2.3.10 of the permit requires that the abnormal operating conditions apply.

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

Chapter IV of IED specifies manual extractive sampling for heavy metals and dioxin monitoring. However, Article 48(5) of the IED enables The Commission to act through delegated, authority to set the date from which continuous measurements of the air emission limit values for heavy metals, dioxins and furans shall be carried out, as soon as appropriate measurement techniques are available within the Community. No such decision has yet been made by the Commission.

The Environment Agency has reviewed the applicability of continuous sampling and monitoring techniques to the installation.

Recent advances in mercury monitoring techniques have allowed standards to be developed for continuous mercury monitoring, including both vapour-phase and particulate mercury. There is a standard which can apply to CEMs which measure mercury (EN 15267-3) and standards to certify CEMs for mercury, which are EN 15267-1 and EN 15267-3. Furthermore, there is an MCERTS-certified CEM which has been used in trials in the UK and which has been verified on-site using many parallel reference tests as specified using the steps outlined in EN 14181.

In the case of dioxins, equipment is available for taking a sample for an extended period (several weeks), but the sample must then be analysed in the conventional way. However, the continuous sampling systems do not meet the requirements of BS EN 1948 which is the standard for dioxin analysis. BS EN 1948 requires traversing the sampler across the duct and collecting parts of the sample at various points across the duct to ensure that all of the gas phase is sampled proportionately, in case there are variations in gas flow rate or composition resulting in a non-homogeneous gas flow. This requirement is particularly important where suspended solids are present in the gas, and dioxins are often associated with suspended solid particles. Continuous samplers are currently designed for operation at one or two fixed sampling points within the duct, and traverses are not carried out automatically. Using such samplers, more information could be obtained about the variation with time of the dioxin measurement, but the measured results could be systematically higher or lower than those obtained by the approved standard method which is the reference technique required to demonstrate compliance with the limit specified in the IED. The lack of a primary reference method (e.g. involving a reference gas of known concentration of dioxin) prohibits any one approach being considered more accurate than another. Because

compliance with the IED's requirements is an essential element of EPR regulation, we have set emission limits for dioxins in the permit based on the use of BS EN 1948 and the manual sampling method remains the only acceptable way to monitor dioxins for the purpose of regulation.

For either continuous monitoring of mercury or continuous sampling of dioxins to be used for regulatory purposes, an emission limit value would need to be devised which is applicable to continuous monitoring. Such limits for mercury and dioxins have not been set by the European Commission. Use of a manual sample train is the only technique which fulfils the requirements of the IED. At the present time, it is considered that in view of the predicted low levels of mercury and dioxin emission it is not justifiable to require the Operator to install additionally continuous monitoring or sampling devices for these substances.

In accordance with its legal requirement to do so, the Environment Agency reviews the development of new methods and standards and their performance in industrial applications. In particular the Environment Agency considers continuous sampling systems for dioxins to have promise as a potential means of improving process control and obtaining more accurate mass emission estimates.

6.8 Reporting

We have specified the reporting requirements in Schedule 5 of the Permit either to meet the reporting requirements set out in the IED, or to ensure data is reported to enable timely review by the Environment Agency to ensure compliance with permit conditions and to monitor the efficiency of material use and energy recovery at the installation.

7 Other legal requirements

In this section we explain how we have addressed other relevant legal requirements, to the extent that we have not addressed them elsewhere in this document.

7.1 The EPR 2010 and related Directives

The EPR delivers the requirements of a number of European and national laws.

7.1.1 Schedules 1 and 7 to the EPR 2010 – **IED Directive**

We address the requirements of the IED in the body of this document above and the specific requirements of Chapter IV in Annex 1 of this document.

There is one requirement not addressed above, which is that contained in Article 5(3) IED. Article 5(3) requires that "In the case of a new installation or a substantial change where Article 4 of Directive 85/337/EC (the EIA Directive) applies, any relevant information obtained or conclusion arrived at pursuant to articles 5, 6 and 7 of that Directive shall be examined and used for the purposes of granting the permit."

- Article 5 of EIA Directive relates to the obligation on developers to supply the information set out in Annex IV of the Directive when making an application for development consent.
- Article 6(1) requires Member States to ensure that the authorities likely to be concerned by a development by reason of their specific environmental responsibilities are consulted on the Environmental Statement and the request for development consent.
- Article 6(2)-6(6) makes provision for public consultation on applications for development consent.
- Article 7 relates to projects with transboundary effects and consequential obligations to consult with affected Member States.

The grant or refusal of development consent is a matter for the relevant local planning authority. The Environment Agency's obligation is therefore to examine and use any relevant information obtained or conclusion arrived at by the local planning authorities pursuant to those EIA Directive articles.

In determining the Application we have considered the following documents: -

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The decision of the North East Lincolnshire Planning Authority to grant planning permission on 14/05/2014.
- The report and decision notice of the local planning authority accompanying the granting of planning permission.
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

The Environment Agency has also carried out its own consultation on the Environmental Permitting Application which includes the Environmental Statement submitted to the local planning authority. The results of our consultation are described elsewhere in this decision document.

7.1.2 Schedule 9 to the EPR 2010 – **Waste Framework Directive**

As the Installation involves the treatment of waste, it is carrying out a *waste operation* for the purposes of the EPR 2010, and the requirements of Schedule 9 therefore apply. This means that we must exercise our functions so as to ensure implementation of certain articles of the WFD.

We must exercise our relevant functions for the purposes of ensuring that the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste and that any waste generated is treated in accordance with Article 4 of the Waste Framework Directive. (See also section 4.3.9)

The conditions of the permit ensure that waste generation from the facility is minimised. Where the production of waste cannot be prevented it will be recovered wherever possible or otherwise disposed of in a manner that minimises its impact on the environment. This is in accordance with Article 4.

We must also exercise our relevant functions for the purposes of implementing Article 13 of the Waste Framework Directive; ensuring that the requirements in the second paragraph of Article 23(1) of the Waste Framework Directive are met; and ensuring compliance with Articles 18(2)(b), 18(2)(c), 23(3), 23(4) and 35(1) of the Waste Framework Directive.

Article 13 relates to the protection of human health and the environment. These objectives are addressed elsewhere in this document.

Article 23(1) requires the permit to specify:

(a) the types and quantities of waste that may be treated;
(b) for each type of operation permitted, the technical and any other requirements relevant to the site concerned;
(c) the safety and precautionary measures to be taken;
(d) the method to be used for each type of operation;
(e) such monitoring and control operations as may be necessary;
(f) such closure and after-care provisions as may be necessary.

These are all covered by permit conditions.

The permit does not allow the mixing of hazardous waste so Article 18(2) is not relevant.

We consider that the intended method of waste treatment is acceptable from the point of view of environmental protection so Article 23(3) does not apply.

Energy efficiency is dealt with elsewhere in this document but we consider the conditions of the permit ensure that the recovery of energy take place with a high level of energy efficiency in accordance with Article 23(4).

Article 35(1) relates to record keeping and its requirements are delivered through permit conditions.

7.1.3 Schedule 22 to the EPR 2010 – **Groundwater, Water Framework and Groundwater Daughter Directives**

To the extent that it might lead to a discharge of pollutants to groundwater (a "groundwater activity" under the EPR 2010), the Permit is subject to the requirements of Schedule 22, which delivers the requirements of EU Directives relating to pollution of groundwater. The Permit will require the taking of all necessary measures to prevent the input of any hazardous substances to groundwater, and to limit the input of non-hazardous pollutants into groundwater so as to ensure such pollutants do not cause pollution, and satisfies the requirements of Schedule 22.

No releases to groundwater from the Installation are permitted. The Permit also requires material storage areas to be designed and maintained to a high standard to prevent accidental releases.

7.1.4 Directive 2003/35/EC – The Public Participation Directive

Regulation 59 of the EPR 2010 requires the Environment Agency to prepare and publish a statement of its policies for complying with its public participation duties. We have published our public participation statement.

This Application has been consulted upon in line with this statement, as well as with our guidance RGS6 on Sites of High Public Interest, which addresses specifically extended consultation arrangements for determinations where public interest is particularly high. This satisfies the requirements of the Public Participation Directive.

Our decision in this case has been reached following a programme of public consultation, on the original application. The way in which this has been done is set out in Section 2.2. A summary of the responses received to our consultations and our consideration of them is set out in Annex 4.

7.2 National primary legislation

7.2.1 **Environment Act 1995**

(i) Section 4 (Pursuit of Sustainable Development)

We are required to contribute towards achieving sustainable development, as considered appropriate by Ministers and set out in guidance issued to us. The Secretary of State for Environment, Food and Rural Affairs has issued *The*

Environment Agency's Objectives and Contribution to Sustainable Development: Statutory Guidance (December 2002). This document:

> "*provides guidance to the Agency on such matters as the formulation of approaches that the Agency should take to its work, decisions about priorities for the Agency and the allocation of resources. It is not directly applicable to individual regulatory decisions of the Agency*".

In respect of regulation of industrial pollution through the EPR, the Guidance refers in particular to the objective of setting permit conditions "*in a consistent and proportionate fashion based on Best Available Techniques and taking into account all relevant matters…*". The Environment Agency considers that it has pursued the objectives set out in the Government's guidance, where relevant, and that there are no additional conditions that should be included in this Permit to take account of the Section 4 duty.

(ii) Section 7 (Pursuit of Conservation Objectives)

We considered whether we should impose any additional or different requirements in terms of our duty to have regard to the various conservation objectives set out in Section 7, but concluded that we should not.

We have considered the impact of the installation on local wildlife sites within 2 km which are not designated as either European Sites or SSSIs. We are satisfied that no additional conditions are required.

(iii) Section 81 (National Air Quality Strategy)

We have had regard to the National Air Quality Strategy and consider that our decision complies with the Strategy, and that no additional or different conditions are appropriate for this Permit.

7.2.2 **Human Rights Act 1998**

We have considered potential interference with rights addressed by the European Convention on Human Rights in reaching our decision and consider that our decision is compatible with our duties under the Human Rights Act 1998. In particular, we have considered the right to life (Article 2), the right to a fair trial (Article 6), the right to respect for private and family life (Article 8) and the right to protection of property (Article 1, First Protocol). We do not believe that Convention rights are engaged in relation to this determination.

7.2.3 **Countryside and Rights of Way Act 2000 (CROW 2000)**

Section 85 of this Act imposes a duty on Environment Agency to have regard to the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty (AONB). There is no AONB which could be affected by the Installation.

7.2.4 **Wildlife and Countryside Act 1981**

Under section 28G of the Wildlife and Countryside Act 1981 the Environment Agency has a duty to take reasonable steps to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which a site is of special scientific interest. Under section 28I the Environment Agency has a duty to consult Natural England in relation to any permit that is likely to damage SSSIs.

We assessed the Application and concluded that the Installation will not damage the special features of any SSSI. As this site overlays the Humber Estuary SAC, SPA and Ramsar an Appendix 11 was sent to consult Natural England, who agreed with our conclusion. An Appendix 4 CROW form recorded this decision and has been kept for record purposes.

The CROW assessment is summarised in greater detail in section 5.4.3 of this document. A copy of the full Appendix 4 Assessment can be found on the public register.

7.2.5 **Natural Environment and Rural Communities Act 2006**

Section 40 of this Act requires us to have regard, so far as is consistent with the proper exercise of our functions, to the purpose of conserving biodiversity. We have done so and consider that no different or additional conditions in the Permit are required.

7.3 National secondary legislation

7.3.1 **The Conservation of Natural Habitats and Species Regulations 2010**

We have assessed the Application in accordance with guidance agreed jointly with Natural England and concluded that there will be no likely significant effect on any European Site.

We consulted Natural England by means of an Appendix 11 assessment, and they agreed with our conclusion, that the operation of the Installation would not have a likely significant effect on the interest features of protected sites.

The habitat assessment is summarised in greater detail in section 5.4 of this document. A copy of the full Appendix 11 Assessment can be found on the public register.

7.3.2 **Water Framework Directive Regulations 2003**

Consideration has been given to whether any additional requirements should be imposed in terms of the Environment Agency's duty under regulation 3 to secure the requirements of the Water Framework Directive through (inter alia) EP permits, but it is felt that existing conditions are sufficient in this regard and no other appropriate requirements have been identified.

7.3.3 **The Persistent Organic Pollutants Regulations 2007**

We have explained our approach to these Regulations, which give effect to the Stockholm Convention on POPs and the EU's POPs Regulation, above.

7.4 Other relevant legal requirements

7.4.1 Duty to Involve

S23 of the Local Democracy, Economic Development and Construction Act 2009 require us where we consider it appropriate to take such steps as we consider appropriate to secure the involvement of interested persons in the exercise of our functions by providing hem with information, consulting them or involving them in any other way. S24 requires us to have regard to any Secretary of State guidance as to how we should do that.

The way in which the Environment Agency has consulted with the public and other interested parties is set out in section 2.2 of this document. The way in which we have taken account of the representations we have received is set out in Annex 4. Our public consultation duties are also set out in the EP Regulations, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS6 and the Environment Agency's Building Trust with Communities toolkit.

ANNEX 1: APPLICATION OF CHAPTER IV OF THE INDUSTRIAL EMISSIONS DIRECTIVE

IED Article	Requirement	Delivered by
45(1)(a)	The permit shall include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	Condition 2.3.3 and Table S2.2 in Schedule 2 of the Permit
45(1)(b)	The permit shall include the total waste incinerating or co-incinerating capacity of the plant.	Condition 2.3.3 and Table S2.2 in Schedule 2
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Condition 3.1.2 and Tables S3.1, S3.1(a), S3.2 and S3.3 in Schedule 3
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	Condition 3.1.2 and Table S3.3 in Schedule 3
45(1)(e)	The permit shall include the sampling and measurement procedures and frequencies to be used to comply with the conditions set for emissions monitoring.	Conditions 3.5.1 and Tables S3.1, S3.1(a), S3.2 and S3.3. also compliance with Articles 10 and 11
45(1)(f)	The permit shall include the maximum permissible period of unavoidable stoppages, disturbances or failures of the purification devices or the measurement devices, during which the emissions into the air and the discharges of waste water may exceed the prescribed emission limit values.	Conditions 2.3.6 to 2.3.11
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Emissions and their ground-level impacts are discussed in the body of this document,
46(2)	Emission into air shall not exceed the emission limit values set out in part of Annex VI.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a
46(5)	Prevention of unauthorised and	The application

IED Article	Requirement	Delivered by
	accidental release of any polluting substances into soil, surface water or groundwater. Adequate storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting.	explains the measures to be in place for achieving the directive requirements
46(6)	Limits the maximum period of operation when an ELV is exceeded to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year. Limits on dust (150 mg/m3), CO and TOC not to be exceeded during this period.	Condition 2.3.6 and condition 2.3.10 and Table S3.1(a)
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m3), CO and TOC not to be exceeded during this period.	Condition 2.3.10
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Schedule 6 details this standardisation requirement
48(2)	Installation and functioning of the automated measurement systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	Condition 3.5.3, and tables S3.1, S3.1(a), and S3.4
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Tables S3.1, S3.1(a), S3.2 and S3.3
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Schedules 4 and 5
49	The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	Tables S3.1, S3.1(a), S3.2 and S3.3
50(1)	Slag and bottom ash to have Total	Conditions 3.5.1 and

IED Article	Requirement	Delivered by
	Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	Table S3.5
50(2)	Flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber.	Pre-operational condition PO6. The application specifies measurement point
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	Condition 2.3.7
50(4)(a)	Automatic shut to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.6
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.6
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.6
50(5)	Any heat generated from the process shall be recovered as far as practicable.	(a) The plant will generate electricity (b)Operator to review the available heat recovery options prior to commissioning (Condition PO2) and then every 2 years (Condition 1.3. 3)
50(6)	Relates to the feeding of infectious clinical waste into the furnace	No infectious clinical waste will be burnt
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit fulfil this requirement
51(1)	Different conditions than those laid down in Article 50 (1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are me.	No such conditions Have been allowed
52(1)	Take all necessary precautions concerning delivery and reception of Wastes, to prevent or minimise pollution.	Conditions 2.3.1, 2.3.3, 3.2, 3.3 and 3.4
52(2)	Determine the mass of each	Volume 2 of the

IED Article	Requirement	Delivered by
	category of wastes, if possible according to the EWC, prior to accepting the waste.	application describes procedures for the reception and monitoring of incoming waste
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 3.5.1 and 1.3.1
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 1.3.1, 2.3.1 and 3.2.1
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.5.1 and pre-operational condition PO3.
55(1)	Application, decision and permit to be publicly available.	Section 2 and annex 4 of the decision document.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2

ANNEX 2: Pre-Operational Conditions

Based on the information on the Application, we consider that we do need to impose pre-operational conditions. These conditions are set out below and referred to, where applicable, in the text of the decision document. We are using these conditions to require the Operator to confirm that the details and measures proposed in the Application have been adopted or implemented prior to the operation of the Installation.

Table S1.4 Pre-operational measures	
Reference	**Pre-operational measures**
PO1	Prior to the commencement of commissioning, the Operator shall send a summary of the site Environment Management System (EMS) to the Environment Agency and make available for inspection all documents and procedures which form part of the EMS. The EMS shall be developed in line with the requirements set out in Section 1 of How to comply with your environmental permit – Getting the basics right. The documents and procedures set out in the EMS shall form the written management system referenced in condition 1.1.1 (a) of the permit.
PO2	Prior to the commencement of commissioning, the Operator shall send a report to the Environment Agency which will contain a comprehensive review of the options available for utilising the heat generated by the waste incineration process in order to ensure that it is recovered as far as practicable. The review shall detail any identified proposals for improving the recovery and utilisation of waste heat and shall provide a timetable for their implementation.
PO3	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency for approval a protocol for the sampling and testing of incinerator bottom ash for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.
PO4	Six months prior to the commencement of commissioning; the Operator shall provide a written commissioning plan, including timelines for completion, for approval by the Environment Agency. The commissioning plan shall include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved.
PO5	Prior to the commencement of commissioning, the Operator shall submit a written report to the Agency detailing the waste acceptance procedure to be used at the site. The waste acceptance procedure shall include the process and systems by which wastes unsuitable for incineration at the site will be controlled. The procedure shall be implemented in accordance with the written approval from the Agency.
PO6	After completion of Gasifier design and at least three calendar months before any furnace operation; the operator shall submit a written report to the Agency of the details of the computational fluid dynamic (CFD) modelling. The report shall demonstrate whether the design combustion conditions comply with the residence time and temperature requirements as defined by the Industrial Emissions Directive.
PO7	Prior to the commencement of commissioning, the Operator shall submit a report on the baseline conditions of soil and groundwater at the installation. The report shall contain the information necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities provided for in Article 22(3) of the IED. The report shall contain information, supplementary to that already provided in application Site Condition Report, needed to meet the information requirements of Article 22(2) of the IED (Industrial Emissions Directive).

Table S1.4 Pre-operational measures	
Reference	**Pre-operational measures**
PO8	Prior to the commencement of commissioning the Operator shall carry out a BS4142 noise assessment for the site in which:- 1. a background noise survey is undertaken and appropriate LA90 values established for each receptor for all times when the plant is intended to be operated. Note that this should include weekends and nights as well as weekdays. It should also ensure section 10 of BS4142 is followed precisely. 2. specific and rating levels are established by modelling. Reference should be made to https://www.gov.uk/government/publications/noise-impact-assessment-information-requirements prior to commencement of the predictions. A full report of the above assessment should be submitted to the agency for approval, and should include if required a plan for the implementation of mitigation measures to minimise the likelihood of complaints at sensitive receptors.
PO9	The Operator shall submit the written protocol referenced in condition 3.2.4 for the monitoring of soil and groundwater for approval by the Environment Agency. The protocol shall demonstrate how the Operator will meet the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the IED. The procedure shall be implemented in accordance with the written approval from the Agency.

ANNEX 3: Improvement Conditions

Based in the information in the Application we consider that we need to set improvement conditions. These conditions are set out below - justifications for these is provided at the relevant section of the decision document. We are using these conditions to require the Operator to provide the Environment Agency with details that need to be established or confirmed during and/or after commissioning.

Reference		Completion date
IC1	The Operator shall submit a written report to the Environment Agency on the implementation of its Environmental Management System and the progress made in the certification of the system by an external body or if appropriate submit a schedule by which the EMS will be certified.	Within 12 months of the completion of commissioning
IC2	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1 & A3 identifying the fractions within the PM_{10}, and $PM_{2.5}$ ranges. The proposal shall include a timetable for approval by the Environment Agency to carry out such tests and produce a report on the results. On receipt of written agreement by the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning.
IC3	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions.	Within 6 months of the completion of commissioning.
IC4	The Operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the combustion gases following the last injection of combustion air in the combustion side of the Milena Gasifier whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency.	Within 9 months of the completion of commissioning.

Reference		Completion date
IC5	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of the Selective Catalytic Reduction (SCR) system and combustion settings to minimise oxides of nitrogen (NO_x) emissions within the emission limit values described in this permit with the minimisation of nitrous oxide emissions. The report shall include an assessment of the level of NO_x and N_2O emissions that can be achieved under optimum operating conditions. The report shall also provide details of the optimisation (including dosing rates) for the control of acid gases and dioxins.	Within 12 months of the completion of commissioning.
IC6	The Operator shall submit a written summary report to the Agency to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	Initial calibration report to be submitted to the Agency within 3 months of completion of commissioning. Full summary evidence compliance report to be submitted within 18 months of commissioning.

ANNEX 4: Consultation Reponses

A) Advertising and Consultation on the Application

The Application has been advertised and consulted upon in accordance with the Environment Agency's Public Participation Statement. The way in which this has been carried out along with the results of our consultation and how we have taken consultation responses into account in reaching our draft decision is summarised in this Annex. Copies of all consultation responses have been placed on the Environment Agency and Local Authority public registers.

The Application was advertised on the Environment Agency website from 15/05/2014 to 16/06/2014. Copies of the Application were placed in the Environment Public Register at Environment Agency, Waterside House, Waterside North, Lincoln. LN2 5HA.

The following statutory and non-statutory bodies were consulted: -

- Local Authority – North East Lincolnshire, Planning and Environmental Health
- Sewage Undertaker – Anglian Water services
- Humber Harbour Authority
- Humber Port Authority
- Local Fisheries - North East - Inshore Fisheries Conservation Authority
- Food Standards Agency -FSA
- Health and Safety Executive - HSE
- Public Health England – North East Lincolnshire
- Director of public Health
- Local fire Service – Humberside Fire and rescue service
- National Grid
- Natural England

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from Director of Public Health	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No concerns and no comment	Standard conditions applied

Response Received from Health and Safety Executive	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No concerns and no comment	Standard conditions applied

Response Received from Anglian Water Services	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Sent through copy of Dahlman Technology B.V. discharge to water consent.	Standard conditions applied

Response Received from National Grid	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Requested that any works are communicated through Plant Protection, and all works adhere to HSG47.	This request was passed to the permit contact officer at the consultants acting on behalf of Dahlman Technologies B.V.

Response Received from Public Health England	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No concerns and no comment	Standard conditions applied

Response Received from Natural England	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Agreement with the Environment Agency's conclusion of no likely significant effect in the Appendix 11.	Standard conditions applied

2) Consultation Responses from Members of the Public and Community Organisations

No responses were received.