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

Our decision document recording our permitting decision

The Permit Number is:	EPR/NP3338CY
The Applicant / Operator is:	Navitas Environmental Limited
The Installation is located at:	Navitas Renewable Energy Park, Appspond Lane, Potters Crouch, St Albans, Hertfordshire. AL2 3NL

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 draft permit we are proposing to issue 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/NP3338CY/A001. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we propose to give to the permit is EPR/NP3338CY. We refer to the proposed permit as "the **Permit**" in this document.

The Application was duly made on 17 September 2012.

The Applicant is Navitas Environmental Limited. We refer to Navitas Environmental Limited as "the **Applicant**" in this document. Where we are talking about what would happen after the Permit is granted (if that is our final decision), we call Navitas Environmental Limited "the **Operator**".

The proposed facility of Navitas Environmental Limited is located at Navitas Renewable Energy Park, Appspond Lane, Potters Crouch, St Albans, Hertfordshire, AL2 3NL.
We refer to this as "the **Installation**" in this document.

How this document is structured

1. Our decision
2. How we reached our decision
3. The legal framework
4. The Installation and general issues
5. Minimising the Installation's environmental impact
6. Application of Best Available Techniques
7. Other legal requirements

Annexes:

- Annex 1 Application of chapter IV of IED
- Annex 2 Pre-operational measures
- Annex 3 Improvement conditions
- Annex 4 Consultation responses

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
AQD	Air Quality Directive
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous emissions monitor
CFD	Computerised fluid dynamics
CHP	Combined heat and power
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
EA	Environment Agency
EAL	Environmental assessment level
EFW	Energy from Waste
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
HMEI	Hypothetically Maximum Exposed Individual
HMIP	Her Majesty's Inspectorate of Pollution
HPA	Health Protection Agency
IBA	Incinerator Bottom Ash

IED	Industrial Emissions Directive (2010/75/EU)
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
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)
Opra	Operator Performance Risk Appraisal
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PCT	Primary Care Trust
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
SCR	Selective catalytic reduction
SGN	Sector guidance note
SHPI(s)	Site(s) of High Public Interest
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 are minded 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 17 September 2012. 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 at that stage. We did not receive any information in relation to the Application that appeared to be confidential in relation to any party, at the time the Application was made.

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 paper copy of the Application and all other documents relevant to our determination (see below) on our Public Register at Apollo Court, Hatfield Office and also sent a copy to St Albans City & District Council for its own 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":

- Food Standards Agency
- Health & Safety Executive
- Hertfordshire Fire & Rescue Service
- National Grid
- Primary Care Trust, NHS Hertfordshire (now Public Health England)
- St Albans City & District Council – Planning
- St Albans City & District Council – Environmental Health

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.

At the time the application was duly made the proposed activities at the site were not deemed to be of High Public Interest, and therefore there was no requirement for additional levels of public consultation at that stage.
The site and this application have become High Public Interest during the determination period due to an incident arising on site in November 2012 whilst under the control of a third party, and this is why this decision is now being consulted on.

The minded to consultation period commenced on 26 November 2013 to 10 January 2014. A notice regarding our draft decision was placed on our website along with the draft permit and draft minded to decision document.

2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued a Schedule 5 request for information notice on 22 March 2013. A copy of the information notice was placed on our public register and sent to St Albans City & District Council for inclusion on its register, as were the responses when received.
The information requested was in relation to operator competence, waste types, air quality modelling data, noise impact assessment, site condition report and the fire risk assessment.

Having carefully considered the Application and all other relevant information, we put our draft decision before the public and other interested parties in the form of a draft Permit, together with this explanatory document. As a result of this stage in the process, the public has been provided with all the information that is relevant to our determination, including the original Application and additional information obtained subsequently, and we have given the public two separate opportunities (including this one) to comment on the Application and its determination. Once again, we will consider all relevant representations we receive in response to this final consultation and will amend this explanatory document as appropriate to explain how we have done this, when we publish our final decision.

We have consulted on our draft decision from 26/11/13 to 10/01/14. A summary of the consultation responses and how we have taken into account all relevant representations is shown in Annex 4.

Finally we issued a second Schedule 5 request for information notice on 24 January 2014. The information requested related to operator competence to ascertain the up-to-date shareholders of the company and certain financial information.

In the light of the explanations given, and the financial forecasts provided in support of this Permit application, we can confirm that any concerns in respect of the operator being able to meet the financial obligations of the permit have been addressed to our satisfaction.

The response to the information request was received along with a claim for commercial confidentiality due to the financial nature of the information. The claim for commercial confidentiality was assessed and accepted in accordance with our guidance. We acknowledge that this is commercially sensitive information and its disclosure would outweigh the presumption of including it as it may provide unfair advantage to competitors.

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 co-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 the permit 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 and general issues

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) – 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 of 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 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” (DAAs) for EPR purposes (see below), such as air pollution control plant, (including storage and preparation of treatment chemicals e.g. lime slaking), and the ash storage bunker, are therefore included in the listed activity description.

An installation may also comprise DAAs, which at this Installation includes the generation of electricity using a steam turbine. This activity comprises one installation, because the incineration plant and the steam turbine are successive steps in an integrated activity.

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

4.1.2 The Site

The Installation is located on a piece of land between the A414 and the M1 motorway, the site is near junction 7 of the M1, approximately 2.2km to the south east of Hemel Hempstead, and 2km to the west of St. Albans; at National Grid Reference TL 109 059.

The site has historically been used as an open windrow compost facility and a wood treatment facility. A pylon is located within the site, managed by the National Grid, and there is a mobile telephone mast in the north east corner.

There are no surface watercourses bordering the Installation.

Sensitive receptors include 19 sites designated as Local Wildlife Sites, and Ancient Woodlands within 2km; there are a few domestic properties in the vicinity and the site is adjacent to a Local Authority Air Quality Management Zone.

The Applicant submitted a plan which we consider is satisfactory, showing the location 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.

Site history:
As mentioned above the site has been used previously for open windrow composting and as a wood recycling operation. Both activities were subject to Environmental Permits.
In November 2012 a fire broke out in the wood storage area. This resulted in a huge fire with several fire crews taking several days to control the blaze, and several months before it was finally extinguished. There was immense pressure on the local water supply system and local neighbourhoods found themselves short of water in some cases.
The site has since been partially cleared and the Applicant will be assessing whether any environmental pollution has occurred as a result of the run off of the fire water, before their operations commence.

We must ensure that both the environment and existing infrastructure (National Grid pylon and power lines) are protected, and it is for this reason that this permit contains detailed site specific pre-operational measures and Improvement conditions which are discussed later in this document.

4.1.3 What the Installation does

The Applicant has described the facility as Energy Recovery. Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the installation is a waste co-incineration plant because:
notwithstanding the fact that waste will be thermally treated by the process; the process is nevertheless 'co-incineration' because it is considered that main purpose of this plant is the generation of energy.

The plant will only produce energy, some of which it will use on site and the majority of which will be exported. The plant will burn only waste wood, of which 1.1MW_{he}/tonne will be recovered.

As this is not a municipal waste incinerator R1 Energy Recovery status is not applicable to this site.

Non-hazardous waste wood is received by arrangement and tipped into the waste reception area. If the incoming waste wood meets the relevant acceptance criteria it will then be fed into the pre-treatment unit for shredding, screening and removal of stones, and metals etc.
Stones will be collected and stored in a separate skip for removal from the site by a licensed waste contractor.
Metals will be collected and stored in a separate area for removal by a reprocessing company for off-site recovery / reuse.

The shredded wood chips will then be transferred from their storage location by covered conveyor to the fuel store within the biomass plant building, and deposited on the push floor. The wood chips are transported across the push floor and eventually fed on to a chain conveyor that feeds the boiler fuel injection system.

The maximum amount of wood in storage is limited to 2500 tonnes at any one time with a maximum residence time of 20 days.

Should we consider in future that the Operator has sufficient controls in place to manage the wood stockpiles then this overall storage limit could increase subject to written approval from the Environment Agency. Although the overall throughput of 86,000 tonnes per annum would not increase as a result.

The boiler has a spreader stoker fuel injection process that loads the wood chips into the furnace. A moving grate ensures the fuel is distributed and combusts evenly. A homogenous mix of the waste wood streams is used as feed stock.

Bottom ash is collected at the end of the grate where it drops into a water sealed quench pit. The bottom ash is collected in skips, which are covered prior to removal from site for onward recovery as preference, or disposal.

The hot exhaust gases from the combustion stage pass to a multi-pass steam boiler that recovers the heat energy from the gas. The boiler will deliver super heated steam to an energy utilisation system to generate electricity.

The energy utilisation system comprises a turbine with a generator and an air cooled condenser (ACC) with condensate pumps.
Condensate from the ACC will be directed to the feed water tank for the boiler system, minimising instances of blow down.

The steam turbine/ boiler will be a multistage condensing turbine, discharging steam, the generator will produced about 12.2MW_e of electricity, for use on site with surplus energy exported to the local distribution network.

The flue gas generated in the combustion process will pass through the boiler sections; entering a dry gas cleaning system before being emitted to air. The gas cleaning system comprises a bag-house filter, storage silos for lime and a filter dust silo. Lime is injected into the bag-house filter which adsorbs contaminants from the gas. Fly ash is collected in an enclosed ash silo, and once a pre determined level is reached, the Operator will arrange for it to be collected and removed from site for disposal.

Only treated gases will be emitted via the 31 metre stack.

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

Waste throughput, Tonnes/line	86,000 tonnes / annum	9.9 tonnes / hour
Waste processed	Waste wood (see section 4.3.5 of this document)	
Number of lines	1	
Furnace technology	Grate	
Auxiliary Fuel	Gas Oil	
Acid gas abatement	Dry	Hydrated lime
NOx abatement	SNCR	Urea
Reagent consumption	Urea : 1050 te/annum Lime: 2250 te/annum Process water: 18,400 te/annum	
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon (to mix with lime as necessary)	
Stack	Height, 31 m	Diameter, 1.45 m
Flue gas	Velocity, 15.0 m/s	
Electricity generated	12.2 MWe	
Electricity exported	11.2 MWe	
Steam production	46.1 tonnes/hour	
Steam conditions	Temperature 140 °C	Pressure, 82 bar/MPa
Waste heat use	Hot exhaust gases pass to steam boiler.	

4.1.4 Key Issues in the Determination

The key issues arising during this determination were operator control and competence, the storage of waste wood and best available techniques (BAT); and 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

The site, which is centred at National Grid Reference TL 109 059, is situated between the carriageways of the M1 motorway and the former M10, with the A4147 to the north, an area of woodland to the south.
The site covers an area of approximately 2.25ha and slopes from the northwest to the south east. Until recently the site was used by a wood chipping and composting company.

The majority of the site had been covered by large stockpiles of waste wood underlain by a combination of concrete and tarmacadam. Power lines pass over the site and a pylon is located in the north western sector.

There are no surface water features in the vicinity of the site. The nearest is a pond approximately 515 metres to the east.

The site was an undeveloped field until the mid 1980s when an industrial building and some tanks were constructed.
Some concrete and tarmacadam were laid in some areas, and the area was used for open windrow composting and as a wood chipping facility under Environment Agency regulation from about 1997 to 2012.

See also the site history section in 4.1.2.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The site will have to be cleared of all previous waste related activities and deposits of waste; as intrusive sampling will be carried out to determine a baseline (see below).

The proposed site design comprises wood storage bays on impermeable surfaces, and a wood processing building linking to the boiler unit.
There will be areas of hardstanding, facilities for staff and visitors, and a lorry reception including a weighbridge.

The potentially polluting substances at the installation would be the raw materials, (abatement control and fuel); including urea and gas oil; waste

waters and ash. Preventative measures are in place to prevent pollution from these substances, which include physical measures (e.g. bunded tanks), and management controls.

Risk management measures will be in place to cover incident response such as fire, and the management of any fire water, (holding lagoons, temporary booms). Collected fire water would be removed from site for disposal at a suitably permitted facility. The main controls are implementing measures to prevent fire in the first instance, such as; limiting size of wood stockpiles, fire breaks between storage bays, limiting storage durations pro-active monitoring of stockpiles.

The wood will be held in bays to prevent escalation of any accidental fire. The bay heights should match the planning approval requirements, thereby ensuring adherence to both permissions (environmental and planning) and maintaining the public expectation of consistency and clarity.

We consider these measures to be satisfactory and the overall level of risk to groundwater to be minimal on this basis.

Under 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 yet submitted a baseline report. We have therefore set a pre-operational condition requiring the Operator to provide this information prior to the commencement of operations. The Operator will not be able to commence operations until this has been completed to the satisfaction of the Environment Agency.

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 section 4.6.2 of Technical Supporting Information of the Application. A pre-operational condition 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 groundwater, 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

General issues that we considered carefully include the Applicant's proposals for waste acceptance procedures, controls for managing unprocessed wood storage and wood processing & storage. The storage of large amounts of wood raises concerns over fire risk.

The Application does not seek to accept general municipal, commercial, industrial, hazardous or clinical waste; however one of the requested waste streams is a mirror entry in the EWC; this is discussed further in section 4.3.5.
The storage bays for both unprocessed and processed wood have been designed in accordance with guidance Pollution Prevention Guideline 29; safe storage – combustible materials to prevent and control fire (currently under review) and Technical guidance note (TGN 7.01) Reducing fire risk at sites storing combustible materials, (Oct 2013).
A fire prevention and fire response plan will be required as a pre-operational condition detailing measures for proactive monitoring, automated fire detection and suppression, and water availability.

A number of pre-operational measures have been included in the draft permit; some are standard for co-incinerator activities, whilst others (PO 04, PO 05, PO 07, PO 08 and PO 09) are specific to this site. These latter ones have been included as while we are satisfied we have enough information in the application to determine the permit; the construction of the installation is a phased approach and therefore certain information will not available until a later date.

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation.

We have assessed the suitability of the Applicant to be able to operate the installation by means of relevant offences checks, technical competence and financial status in accordance with our Regulatory Guidance Note 1; Understanding the meaning of operator.

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.

However as this determination process has necessarily taken a number of months and there have been changes to the structure of the company, we have repeated these checks at the end of the process using the information provided in the 2nd Schedule 5 notice (see section 2.3).

The level of technical competence remains unchanged; and no new relevant convictions have been identified.

The operator provided the requested financial information. In the light of the explanations given, and the financial forecasts provided in support of this Application, we can confirm that any concerns in respect of the Operator being able to meet the financial obligations of the permit have been addressed to our satisfaction.

The co-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 score is 152.

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 (section 4.1.1 supporting information) that they will implement an Environment Management System (EMS) that complies with the requirements of 'How to comply with your Environmental Permit' and would be to ISO 14001 standard. A pre-operational condition 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 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 submitted an Accident Management Plan (section 4.2 Technical Supporting Information), and additional information was submitted in response to the Schedule 5 notice. Having considered all of the 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.

4.3.5 Operating techniques

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

Table S1.2 Operating techniques

Description	Parts	Date Received
Application	The response to Part B3 section 3a in the Application; document Final Report 12150i1 section 5 Operations (all parts).	17/09/13
Response to Schedule 5 Notice dated 22/03/13	Response to question A1 detailing operator competence	09/04/13
Response to Schedule 5 Notice dated 22/03/13	Response to question B1 detailing waste types Response to question B2 detailing Air Quality Modelling data Response to question B4 detailing Site Condition Report Response to question B5 detailing Fire Risk Assessment	26/04/13
Response to Schedule 5 Notice dated 22/03/13	Response to question B3 detailing Noise Impact Assessment	30/04/13
Response to Schedule 5 follow up request dated 28/06/13	Additional information provided in response to questions B2, B4 and B5	16/07/13
EA Guidance	TGN 7.01 Reducing fire risk at sites storing combustible materials.	31/10/13

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.

We have also specified the following limits and controls on the use of fuels in Table S2.1 of the permit: (other raw materials are listed for information)
An improvement condition has been included to ensure efficient combustion, as it is possible to reduce the CV by burning material with a high moisture content, and therefore reduce efficiency.

Raw Material or Fuel	Specifications	Justification
Gas Oil <200 m^3 a year; 50,000 litre bunded storage tank	< 0.1% sulphur content	As required by Sulphur Content of Liquid Fuels Regulations.
Flue gas treatment chemicals	-	-
Lime	-	-
Urea	-	-
Activated carbon	-	-
Moisture Content of chipped wood	As approved in writing by the Environment Agency under IC 8.	Moisture limit to be prescribed upon completion of improvement condition IC 8.

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, if possible, and containing information on the quantity of each type of waste, where appropriate. The Application contains a list of those wastes (section 5.2 Technical Supporting information), 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.

The Installation will accept non-hazardous waste wood that cannot be reused or recycled and would otherwise go to landfill.

Upon further consideration we have decided to refuse to permit one of the waste types requested in the application. This EWC waste code 20 01 37* is a mirror entry indicating the waste has the potential to be either hazardous or non-hazardous below certain dangerous substances thresholds. If the waste is below these thresholds and is non hazardous then it meets the criteria for EWC code 20 01 38 which is included in the permit anyway, and so the code 20 01 37* is not required.

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 86,000 tonnes per annum. This is based on the installation operating 8,200 hours per year at a nominal capacity of 9.9 tonnes per hour. The plant is designed to run for 24 hours a day, for about 8,200 hours a year, allowing for shutdown for maintenance.

We have further restricted the operation of the plant by limiting the amount of unprocessed and processed wood that can be stored at any one time. This is to ensure that stockpiles do not build up and is part of the fire prevention strategy.

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 in section 6 of this document.

4.3.6 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.

4. The moisture content of the chipped wood can have an impact on the efficiency of the combustion unit, (a reference figure would be about 20% to 25%). A pre operational condition has been included to request a report on the optimal level of moisture content.

(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, (section 4.3 of Technical supporting information).

These measures include:

- Internally insulated combustion chamber deigned to minimise heat loss via radiation and other losses;
- Automated control system regulating combustion air requirements to ensure that only the air necessary to achieve combustion conditions and give maximum combustion efficiency (whilst minimising NOx and CO emissions) is used;
- Flue Gas Recirculation (FGR) in conjunction with selective non-catalytic reduction (SNCR);
- Appropriate insulation levels on high-temperature circuits;
- Selection of high efficiency electrical motors and variable speed drives;
- Fast action roller shutter doors on the waste reception area;
- Fully draught proof and double glazed self closing internal doors of heat parts of the building, control room, offices etc.;
- Space heating control system;
- Motion sensors for internal lighting.

The Application states that the energy generation per unit of waste can be expressed as 1.1MW_h/tonne of waste processed. The plant will generate up to 12.2MW_e per annum with a CV of the waste of about 14 MJ / kg.

(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*".

The Installation will primarily generate electricity, but will also provide heat in the form of steam for other internal processes. The electrical output of the plant will be 12.2MW_e.

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.

We consider that, within the constraints of the location of the Installation explained above, the Installation will recover heat as far as practicable to generate steam, and therefore that the requirements of Article 6(6) are met.

(iv) Choice of Steam Boiler

The energy from the combustion process is used to produce saturated steam in a steam boiler. The boiler is a single drum natural circulation boiler, It is a 3 pass system and contains a set of safety valves to protect the boiler system from overpressure. Alarms are in place for high, low water levels and high steam pressure.
The boiler design and operation are designed to reduce dioxin formation whilst maintaining efficiency.

(v) Choice of Cooling System

An air cooled condenser will condense steam at the end of the power generating process. Hot water from the ACC will be returned to the boiler feed water system. This is a closed loop cooling system which minimises the instances of blow down.

(vi) Permit conditions concerning energy efficiency

A pre-operational condition 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.

Condition 1.2.2 has been included in the Permit, which require the Operator to review the options available for heat recovery on an ongoing basis.

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 amount of wood waste 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.

4.3.7 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, urea and activated carbon (if required) 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 SNCR 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 section 4.2 of the Permit.

The Application contains a list of raw materials, which includes the indicative usage per year, environmental fate and consideration of alternatives. Permit condition 1.3.1 will ensure regular reviews are undertaken.

4.3.8 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 and boiler blow down.

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 3.1.4 and associated Table S3.6 specify limits for total organic carbon (TOC) in bottom ash of 3%. 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 bottom 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, a pre-operational condition requires the Operator to provide a written plan for approval by the Environment Agency detailing the ash

sampling protocols. Table S3.4 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 recycling of bottom ash.

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 Appendix C 'detailed dispersion modelling' Report 12150i1 of the Application. The assessment comprises:

- An H1 screening assessment of emissions to air from the operation of the biomass combustion plant.
- Dispersion modelling of emissions to air from the operation of the biomass combustion plant

- A study of the impact of emissions on nearby sensitive habitat / conservation sites.

This section of the decision document deals primarily with the dispersion modelling of emissions to air from the combustion plant and its impact on local air quality. The impact on conservation sites is considered in section 5.4.

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 4.2 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 Luton Airport between 2006 and 2010.
This site was chosen as it lies only 15km to the north of the installation, and is deemed to show representative data. The surface characteristics and land use surrounding the site were 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
    - Particulate matter (PM_{10} and $PM_{2.5}$)
    - Carbon monoxide (CO)
    - Sulphur dioxide (SO_2)
    - Hydrogen chloride (HCl)
    - Hydrogen fluoride (HF)
    - Group 1 metals: cadmium (Cd) and thallium (Tl)
    - Group 2 metals: mercury (Hg)
    - Group 3 metals: antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni) and vanadium (V)
    - Volatile organic compounds (VOCs) as benzene
    - Ammonia (NH_3)
    - Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (PCDD/Fs referred to as dioxins and furans)
    - Polycyclic aromatic hydrocarbons (PAHs), as benzo(a)pyrene (BaP)

- Second, the assessment assumed that the thermal treatment plant will be operating at full capacity for 24 hrs a day, 365 days a year. This will not be the case, so based on this presumption assumes a worst case scenario.

- And that it operates continuously at the relevant long-term or short-term emission limit values, i.e. the maximum permitted emission rate

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

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.

We requested further information from the Applicant to demonstrate that the metals emissions are not likely to be greater than those from a municipal waste incinerator. The Applicant provided a report from a similar operation that demonstrated the metals emissions were not exceeded during operation of this type of plant. Appropriate emission limit values will be included in the permit in Table S3.1.

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.

Assessment of Emissions to Air (1)

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m³		µg/m³	µg/m³	% of EAL	µg/m³	% of EAL
NO_2	40 (LT)	1	28.9	1.26	**3.15**	30.2	75.4
	200 (ST)	2	57.8	30.3	**15.2**	88.1	44.1
PM_{10}	40 (LT)	1	21.3	0.09	0.23	21.4	53.5
	50 (ST)	3	42.6	0.87	1.74	43.47	86.9
$PM_{2.5}$	25 (LT)	1	14.1	0.09	0.36	14.19	56.8
SO_2	50 (LT)	1			0.00	0.00	0.0
	266 (ST)	4	7.72	49.72	18.7	57.44	21.6
	350 (ST)	5	7.72	41.99	12.00	49.71	14.2
	125 (ST)	6	7.72	21.44	17.2	29.16	23.3
HCl	750 (ST)	7	2.5	14.2	1.8933333	16.7	2.23
HF	160 (ST)	7	3	0.95	0.59375	3.95	2.5
CO	10000 (LT)	9	818	18.6	0.19	837	8.4
	30000 (ST)	10	818	23.66	0.08	842	2.8
VOC	5 (LT)	1	0.43	0.09	1.80	0.520	10.40
PAH	0.00025 (LT)	1	0	0.0000054	2.16	0.000005	2.2
NH_3	180 (LT)	1	1.54	0.09	0.05	1.63	0.91
	2500 (ST)	10	3.08	2.37	0.09	5.45	0.2

LT	Long term
ST	Short term
	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

Assessment of Emissions to Air (2)

Pollutant	EQS / EAL		Back-ground	Process Contribution		Predicted Environmental Concentration	
	µg/m^3		µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
Cd	0.005 (LT)	1	0.00017	0.00045	**9.0**	0.00062	12.4
Tl						0	
Hg	0.25 (LT)	1	0.0017	0.00045	0.18	0.00215	0.86
	7.5 (ST)	2	0.0034	0.01183	0.16	0.01523	0.203
As	0.003 (LT)	1	0.001	0.0005	**16.67**	0.00150	50.0
Cr (VI)	0.0002 (LT)	1	0.00000	0.0001	**50.00**	0.00010	50.0
Ni	0.02 (LT)	1	0.00164	0.0005	2.50	0.00214	10.7

LT	Long term
ST	Short term
1	Annual Mean
2	1-hr Maximum
3	24-hr Maximum

(i) Screening out emissions which are insignificant

From the tables above the following 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. These are:

- Particulate matter (PM_{10} and $PM_{2.5}$)
- Hydrogen chloride (HCl)
- Hydrogen fluoride (HF)
- Carbon monoxide (CO)
- Ammonia (NH_3)

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.

(ii) Emissions unlikely to give rise to significant pollution

Also from the tables above the following emissions (which were not screened out as insignificant) have been assessed as being unlikely to give rise to significant pollution in that the predicted environmental concentration is less than 100% (taking expected modelling uncertainties into account) of both the long term and short term EQS/EAL

- Oxides of nitrogen (NO_x), expressed as NO_2 (short-term & long-term)
- Sulphur dioxide (SO_2)
- Volatile organic compounds (VOCs) as benzene
- Polycyclic aromatic hydrocarbons (PAHs), as benzo(a)pyrene (BaP)

For these emissions, 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.

(iii) Emissions requiring further assessment

All emissions either screen out as insignificant or where they do not screen out as insignificant are considered unlikely to give rise to significant pollution.

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 greater than 1% of the EUEQS and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the EUEQS being exceeded. The peak short term PC is marginally above the level we would consider insignificant (>10% of the EUEQS). However it is not expected to result in the EUEQS being exceeded.

(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 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 tables 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.

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.

Whilst SO_2 emissions cannot be screened out as insignificant, the Applicant's modelling shows that the installation is unlikely to result in a breach of the EAL or EUEQS. The Applicant is required to prevent, minimise and control SO_2 emissions using the best available techniques, this is considered further in Section 6. We are satisfied that SO_2 emissions will not result in significant pollution.

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

The above table shows that for CO 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 above table shows that for VOC emissions, the peak long term PC is greater than 1% of the EAL/EQS and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the EQS being exceeded.

The Applicant has used the EQS for benzene for their assessment of the impact of VOC. This is based on benzene having the lowest AQS of any of the potential VOCs that may be emitted. 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 table 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, except for NO_x where the PC is 3.15% of the long-term EQS of 40 µg/m^3. Even so, from the table above, the emission is not expected to result in the EAL being exceeded.

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 SNCR NO_x abatement system.

Whilst all emissions cannot be screened out as insignificant, the Applicant's modelling shows that the installation is unlikely to result in a breach of the EAL. 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.

In section 5.2.1 above, the following emissions of metals were screened out as insignificant:

- Group 2 metals: mercury (Hg)

Also in section 5.2.1, the following emissions of metals whilst not screened out as insignificant were assessed as being unlikely to give rise to significant pollution:

- Group 1 metals: cadmium (Cd),
- Group 3 metals: arsenic (As), chromium VI (Cr(VI))

There were no metal emissions requiring further assessment. From this assessment the Applicant has concluded that exceedences of the EAL for all metals are not likely to occur. The installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document. The Environment Agency's experience of regulating incineration plant is that emissions of metals are in any event below the Annex VI limits set in IED.
We therefore agree with the Applicant's conclusions.

Consideration of Cr(VI).

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 (0.0002µg/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 will be 0.1 ng/m^3.

There is little data available on the background levels of Cr(VI); so we have assumed this to be 20% of the total Cr background level, 20% is the typical value of Cr(VI) in total Cr reported in the environment in the EPAQS Guidelines.

The Applicant has used the above data to model the predicted Cr(VI) impact. The PC is predicted as 50%, the PEC is predicted as 50%.

This assessment shows that an exceedence of the EAL for Chromium (VI) is not likely. The installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document.

We agree with the Applicant's conclusions.

5.2.4 Consideration of Local Factors

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

St Albans City & District Council has declared an Air Quality Management Area (AQMAs) with respect to NOx. This is designated as St Albans AQMA No. 2 which comprises the area around Beechtree Cottages, Hemel Hempstead Road, St Albans (adjacent to junction of M1 (J7) and M10).
This lies 100m north west to the proposed Installation. Beechtree Cottages are identified as receptor R1 within the Applicant's air quality model.

The Applicant's modelling predictions for the pollutants in the AQMA are the same as the in the tables above. The figures shown indicate the predicted peak ground level impact on pollutant concentrations in ambient air within the AQMA, being at Beechtree Cottages, the closest receptor with generally the highest PCs for the modelled pollutants.

Overall, whilst emissions cannot be screened out as insignificant, the Applicant's modelling shows that the installation is unlikely to result in a breach of the EUEQS within the AQMA.

The Applicant is required to prevent, minimise and control emissions using the best available techniques; this is considered further in Section 6.

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 Installation 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).

Although this application is not for a Municipal Waste Incinerator, it is for an incineration process. The expert opinions given below are still relevant as representing a worst case scenario based on the incineration of widely variable waste types. In this application only biomass will be used.

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 PCT (England), FSA and in some cases the HPA. In this case the PCT also consulted with the HPA. We also consult the local communities who may raise health related issues. All 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 Applicant has modelled these effects using basic algorithms in HMIP (1996).

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. 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.

Receptor:	TDI	Background Intake	Incremental intake	Total intake	% Total Intake	Risk to human health
Infant HMEI	2	0.66	0.08	0.74	37	low
Adult HMEI	2	0.56	0.07	0.63	32	low

Calculated maximum daily intake of dioxins by local receptors resulting from the operation of the proposed facility Units: **(pg WHO-TEQ/kg/d)**

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.

Although this application is not for a Municipal Waste Incinerator, it is for an incineration process. The expert opinions given below are still relevant as representing a worst case scenario based on the incineration of widely variable waste types. In this application only biomass will be used.

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 µg/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."

This application is not for a municipal waste incinerator, but it is an incineration process. The above expert opinion is still applicable to this operation which has a more consistent waste stream and is less complex.

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 Particulate matter (PM_{10} and $PM_{2.5}$), Hydrogen chloride (HCl), Hydrogen fluoride (HF), Ammonia (NH_3) and Carbon monoxide (CO) have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of oxides of nitrogen (NO_x), expressed as NO_2 (short-term & long-term), Sulphur dioxide (SO_2), Volatile organic compounds (VOCs) as benzene, and Polycyclic aromatic hydrocarbons (PAHs), as benzo(a)pyrene (BaP) have not been screened out as insignificant, the assessment still shows that the predicted environmental concentrations are well within air quality standards or environmental action levels.

The Environment Agency has reviewed the methodology employed by the Applicant to carry out the health impact assessment.
We agree that the Applicant's conclusions for human health impact from dioxins, furans and OCB's can be used for the permit determination.

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 Health Protection Agency, local Primary Care Trust and Food Standards Agency were consulted on the Application. The HPA concluded that they had no significant concerns regarding the risk to the health of humans from the installation. Details of the response provided by the HPA 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

There are no Natura 2000 (i.e. Special Areas of Conservation, Special Protection Areas and Ramsar) sites (Habitats Directive) within 10Km of the proposed Installation.

There are no Sites of Special Scientific Interest (CROW Act) within 2Km of the proposed Installation.

5.4.2 Assessment of Non-Statutory Sites

The following non-statutory local wildlife and conservation sites are located within 2Km of the Installation:

Local Wildlife Sites:
Westwick Row Wood
Blackwater Wood
Piecorner Wood and Hanging Wood
Featherbed Lane Copse by Serge Hill
Wellfield Spring
Prae Wood
Birch Wood
Westwick Hall
Appspond Wood
Potterscrouch Section
Potters Crouch Plantation
Long Spring
Scrubs Wood
Park Wood
Gorehambury Cottage Area
Gorhambury Icehouse
Temple Cottage Area, Gorhambury
Windmillhill Wood and adjoining Woodland
Prae Wood Farm

Ancient Woodland –
Hanging / Pie Cornerwoods
Blackwater Wood
Park Wood
Appspond Wood
Scrubs Wood
Madams/Birch Woods
Prae Wood

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

We assess the receptor that is expected to experience the greatest impact (generally the nearest receptor). The assessment of the receptor which could potentially be most affected determined 'no significant impact'; therefore we are satisfied that there will be no significant impact on the remaining sites.
No further assessment is required.

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:
- that there is a total failure of abatement and that the abatement is 90% efficient.

This is a worst case scenario in that these abnormal conditions include a number of different equipment failures not all of which will necessarily result in an adverse impact on the environment (e.g. a failure of a monitoring instrument does not necessarily mean that the incinerator or abatement plant is malfunctioning). This analysis assumes that any failure of any equipment results in all the negative impacts set out above occurring simultaneously.

An abnormal operation that results in an increase in emissions (as above) would typically be of short duration, lasting less than 1 hour. For periods longer than 1 hour the plant will be shut down.

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

Assessment of Emissions to Air (3)

Pollutant	EQS / EAL Short-Term		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m³		µg/m³	µg/m³	% of EAL	µg/m³	% of EAL
NO_2	200	2	57.8	99.9	50.0	157.7	78.9
PM_{10}	50	3	42.6		0.00	42.6	85.2
SO_2	266	4	7.72	497.2	186.9	504.92	189.8
	350	5	7.72	125.9	35.97	133.62	38.2
HCl	750	6	2.5	42.6	5.68	45.1	6.01
HF	160	6	3	2.9	1.8125	5.90	3.7
Hg	7.5	1	0.0034		0.00	0.00340	0.045
Dioxins			8.5E-09	1.26E-07		1.35E-07	

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.

- Hydrogen Chloride
- Hydrogen Fluoride

Also from the table above emissions of the following pollutants (which were not screened out as insignificant) have been assessed as being unlikely to give rise to significant pollution in that the predicted environmental concentration is less than 100% of short term EQS/EAL.

- NO_x
- SO_2 (99.73rd %ile of 1 hour means)

For SO_2 (99.9th %ile of 15 min means) the PEC is greater than the short term EQS.
This exceedence is based on the worst case scenario of the plant operating at emission limit values. The waste wood is unlikely to contain high levels of sulphur and there is unlikely to be the number of shutdowns per year coinciding with the worst case meteorological conditions that would lead to actual exceedences of the 15-minute mean for SO_2.

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. Except that if dioxin emissions were at 10ng/m^3 for the maximum period of abnormal operation, this would result in an increase of approximately 70% in the TDI reported in section 5.3.2. In these circumstances the TDI would be 0.68 pg(I-TEQ/ kg-BW/day), which is 34% of the COT TDI. At this level, emissions of dioxins will still not pose a risk to human health.

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. They are: nitrogen dioxide, sulphur dioxide, cadmium, arsenic, chromium VI.

- 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 and engineering critical - high skill req. - not widely proven - need 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 and mechanical stoker
- Fluidised Bed
- Moving Grate elevated spreader stoker

The Applicant has proposed to use a furnace technology comprising moving grate elevated spreader stoker both of which 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 gas oil as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on it having a low sulphur content and being suitable for auxiliary firing, for example, during start up.

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	May “blind” more than		Small plant.

	applications Smaller plant.	fabric filters		High 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.

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.

The Applicant proposes to use SNCR with urea as the reagent.

Emissions of NO_x cannot be screened out as insignificant at all receptors, however it does not exceed the EAL at any receptor. The Applicant has not carried out a full cost / benefit study of the alternative techniques. Using SNCR with urea as a reagent is considered to be BAT for most plant as mentioned above. By including the Improvement Condition described below as a check, the Environment Agency agrees that this technique is BAT for the installation.

The amount of urea used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH_3 slip. An Improvement condition 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 on a quarterly basis in the first 12 months, then 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 scrubbing	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 scrubbing	Low water use Reagent consumption	Higher solid residue production Reagent		All plant

	may be reduced by recycling in plant Lower energy use Higher reliability	consumption controlled only by input rate		
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 Type: Lime	Very good removal rates Low leaching solid residue Temperature of reaction well suited to use with bag filters	Corrosive material May give greater residue volume if no in-plant recycle	Wide range of uses	MWIs, CWIs
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 gas oil as the support fuel on the basis that it will have a low sulphur content and is suitable for auxiliary firing, and at start up for example; and we agree with that assessment.

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 this case, the Applicant does not propose using wet scrubbing, and the Environment Agency agrees that wet scrubbing is not 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.

In this case, the Applicant proposes to use hydrated lime. 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.

The Applicant will only use activated carbon if required to apply further controls to emissions of organic compounds and metals. In this circumstance the Applicant will pre mix the hydrated lime and activated carbon.
The Applicant has justified combined feed on the ground that it is not a continuous process and we are satisfied their proposal are BAT.

6.2.6 Metals

Metals				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Effective Particulate matter removal			Covered in section on particulate matter	All plant
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 will only use activated carbon if required to apply further controls to emissions of organic compounds and metals. In this circumstance the Applicant will pre mix the hydrated lime and activated carbon.
The Applicant has justified combined feed on the ground that it is not a continuous process and we are satisfied their proposal 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.

Taking this into account, the net emissions of CO_2 from the installation are estimated at 121,000 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 energy efficiency as part of its BAT options appraisal, (refer section 4.3.6 of this document).
The following factors can 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 Environment Agency is satisfied that the operator will take the necessary measures to ensure that energy is used efficiently at 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 co-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 Equivalence) 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. Sections 5.2 and 5.3 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

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. The proposal for the surface water containment system, to be submitted under a pre-operational condition will be subject to approval by the Environment Agency.
Accidental emissions will be minimised by the measures described in the fire prevention and fire response plan (including fire water containment) required under a pre operational condition.

6.5.2 Emissions to sewer

The only effluent produced by the Installation will be boiler water blowdown. This will be discharged to sewer under consent from the appropriate sewerage company.
There is no requirement for emission limits to be set as the release is not significant and will be treated at the sewerage treatment works which will have limits in place for the protection of the environment.

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.

Fugitive releases may occur in the event of a spillage of raw materials or ash products. However, any spillage is likely to be small and the main raw material and ash storage tanks/silos are all located on areas of hard-standing within the building. The waste reception building is kept under a slight negative pressure by extracting the building air to the combustion unit to minimise fugitive releases of dust.

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

The incoming waste wood has low potential for odour; no odour is expected to reach beyond the site boundary. The waste reception building is kept under a

slight negative pressure by extracting the building air to the combustion unit to minimise fugitive releases of odour.

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise odour and to prevent pollution from odour.

Waste accepted at the installation will be delivered in covered vehicles or within containers and bulk storage of waste will only occur in the installation's waste bunker. A roller shutter door will be used to close the entrance to the tipping hall outside of the waste delivery periods and combustion air will be drawn from above the waste storage bunker in order to prevent odours and airborne particulates from leaving the facility building.

6.5.5 Noise and vibration

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise noise and vibration and to prevent pollution from noise and vibration outside the site.

The application contained a noise impact assessment which identified local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS4142 to compare the predicted plant rating noise levels with the established background levels.

The conclusion is that noise emissions from operations at the site are unlikely to give rise to complaints at any time of day at any of the noise sensitive receptors.

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

The adjacent Air quality Management Area has been considered and is covered in section 5.2.4 of this document.
In summary, whilst emissions cannot be screened out as insignificant, the Applicant's modelling shows that the installation is unlikely to result in a breach of the EUEQS within the AQMA.

(ii) National and European EQSs

We do not consider that the Operator would need to go beyond BAT in order to achieve an EU EQS.
The relevant EQS' are covered in more detail in sections 5.1 and 5.2 of this decision document.

(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

We have set a pre-operational condition requiring a commissioning plan that includes: 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. A report will be

submitted to the Environment Agency in the event that the actual emissions exceed expected emissions.
This plan will be used to determine whether it will be necessary to set any additional limits.

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.

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.

Monitoring of both NH_3 and N_2O has been set as a requirement of the permit to demonstrate the optimum environmental performance of the NOx abatement process.

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 will not be providing a back-up CEMS. They confirmed that failure of the monitoring equipment will initiate a shutdown of the plant as there will no means of demonstrating compliance with IED abnormal limits. We have incorporated this into Table S1.2 of the permit and there is a definition of IED abnormal operation in Schedule 6 of the permit.

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 4 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 Hertfordshire County Council to grant planning permission on 2nd December 2010.
- The report and decision notice of the planning authority accompanying the grant of planning permission.
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

From consideration of all the documents above, the Environment Agency considers that no additional or different conditions are necessary.

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 is being 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 draft decision in this case has been reached following a programme of public consultation, both on the original application and later, separately, on the draft permit and this draft decision document. The way in which this has been done is set out in Section 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 2Km 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.
There are no SSSI within the screening distance of this location.

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.

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 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 3.1.1 Tables S3.1 and S3.2
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	n/a
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 3.5.3 and Tables S3.1, S3.2, S3.3 and S3.4. 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 2.3.9
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 parts 4 or determined in accordance with part 4 of Annex VI.	Conditions 3.1.1 and 3.1.2 and Table S3.1

IED Article	Requirement	Delivered by
46(3)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(4)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(5)	Prevention of unauthorised and 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.	The application explains the measures to be in place for achieving the directive requirements
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Table S3.1
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 and S3.4
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Table S4.1
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.	Conditions in section 4.2 of permit.
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.	Conditions in section 4.2 of permit.
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	Condition 3.5.1 and Table S3.1
50(2)	Flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber.	Requirement covered by PO 04 and IC4

IED Article	Requirement	Delivered by
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 and use heat to produce steam (b) Operator to review the available heat recovery options prior to commissioning and then every 2 years (Condition 1.2.3.)
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
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.	The application describes procedures for the reception and monitoring of incoming waste. And Pre-operational measure PO 05 will confirm.
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	The application describes procedures for the reception and monitoring of incoming waste. And Pre-operational measure PO 05 will confirm.
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1 and 3.5.1 of the permit

IED Article	Requirement	Delivered by
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 2.3.1 and 3.2.1 of the permit
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
55(1)	Application, decision and permit to be publicly available.	These will be public register documents.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2 of the permit

ANNEX 2: Pre-Operational measures

Based on the information on the Application, we consider that we do need to impose pre-operational measures. These conditions are set out below and referred to, where applicable, in the text of the decision document. Some pre-operational measures are standard for a co-incinerator; others are specific to this site to ensure adequate risk management measures will be in place prior to operations commencing.

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.

The pre-operational measures are detailed in table S1.4 of the permit. They are incorporated into the permit by way of condition 2.6.

Table S1.4 Pre-operational measures

Reference	Pre-operational measures
PO 01	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 accordance with the requirements set out in How to comply with your environmental permit. The EMS will include an Accident Management Plan developed in accordance with the requirements set out in How to comply with your environmental permit, TGN7.01 Reducing fire risk on sites storing combustible materials and H1. Commissioning shall not commence until this EMS is approved; 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.
PO 02	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.
PO 03	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency for approval; a written 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, and with reference to the requirements in Table S3.4 of the permit.
PO 04	Prior to the commencement of commissioning; the Operator shall submit to the Environment Agency for approval; a written Commissioning plan, and proposed timelines for completion of commissioning.

Table S1.4 Pre-operational measures	
Reference	**Pre-operational measures**
	The Commissioning plan shall include, but is not limited to; the objectives of the commissioning process; the expected durations of commissioning activities; expected emissions to the environment during the different stages of commissioning; reporting schedule for emissions the different stages of commissioning; the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions; As built plant layout drawings; Computational Fluid Dynamic (CFD) modelling to demonstrate that the design combustion conditions comply with the residence times and temperature requirements of IED; Detailed methodologies and definitions for the start-up and commission of the plant and equipment. Commissioning shall not commence until this Commissioning plan is approved; and shall then be carried out in accordance with the approved Commissioning plan.
PO 05	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency for approval a written Waste report 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 report as approved. Commissioning shall not commence until this Waste report is approved; and the waste procedure shall then be carried out in accordance with the approved Waste report.
PO 06	Prior to the commencement of commissioning, the Operator shall submit a written report to the Environment Agency on the baseline conditions of soil and groundwater at the installation. The report will constitute the baseline survey of the site with results of intrusive monitoring carried out prior to construction of the facility. The baseline survey will assess dioxins/ furans, dioxin-like PCBs, PAHs and heavy metal contents in the vicinity of the Installation. The survey and reporting format shall be to a specification agreed in writing with the Environment Agency. Commissioning shall not commence until the written report is approved.
PO 07	At least 8 weeks prior to the commencement of commissioning of the wood chipping operation, the Operator shall submit a written report to the Environment Agency for approval on the wood pre-treatment process. This report should demonstrate that the necessary procedures are in place for the commissioning and subsequent operation of wood pre-treatment processes. The report should include, but is not limited to: a copy of roles and responsibilities for the pre-treatment process; a copy of the operations & maintenance contract relating to the pre-treatment process; confirmation of how the wood chipping process can achieve appropriate size for most efficient combustion; a detailed plan showing the locations of the storage facilities and maximum storage

Table S1.4 Pre-operational measures	
Reference	**Pre-operational measures**
	capacities; and identifying fire breaks and vehicle access routes; details of a planned maintenance schedule for the pre-treatment plant; Commissioning shall not commence until this pre-treatment report is approved; and the procedures shall then be carried out in accordance with the approved report.
PO 08	At least 8 weeks prior to the commencement of commissioning of the biomass boiler operation, the Operator shall submit a written report to the Environment Agency for approval on the biomass boiler operation. This report should demonstrate that the necessary procedures are in place for the commissioning and subsequent operation of the biomass boiler. The report should include, but is not limited to: a copy of roles and responsibilities for the biomass boiler operation; a copy of the operations & maintenance contract relating to the biomass boiler; details of a planned maintenance schedule for the biomass boiler. Commissioning shall not commence until this report is approved; and the procedures shall then be carried out in accordance with the approved report.
PO 09	At least 8 weeks before operations commence the operator shall submit to the Environment Agency for approval a Fire Prevention and Fire Response report. This report should demonstrate that the necessary measures are in place for fire risk management; and should be written with reference to How to comply with your environmental permit: Reducing fire risk on sites storing combustible materials. The report shall include, but is not limited to: detailed site plans showing the wood storage area and the extent of buffer zones (6m) between storage areas and around the pylon; Details of water availability and water pressures locally, with confirmation of water storage capacity details of fire prevention measures (e.g. automatic fire detection system, thermal imaging) and justification for measures chosen; details of fire response measures (e.g. automatic fire suppression system, collection of fire water run-off) and justification for measures chosen. Operations shall not commence until this report is approved. The procedures shall be implemented in accordance with the written report as approved.

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 and appear in table S1.3 of the permit; incorporated into the permit by way of condition 2.5.

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.

We have imposed improvement conditions to ensure that:

- appropriate measures are in place to ensure that accidents that may cause pollution are minimised.
- information which is not currently available is submitted as soon as practicable.

Some of these requirements are not improvements as such but matters where we require the Operator to provide us with details by specified dates.

Table S1.3 Improvement programme requirements

Reference	Requirement	Date
IC 1	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 date on which waste is first burnt.
IC 2	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, 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.
IC 3	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. This report shall include but is not limited to: an Energy report detailing the energy flows and volumes and overall energy, balance;	Within 4 months of the completion of commissioning.

	a Water report detailing the water flows and volumes and overall water balance; a validation of combustion conditions; an assessment of dioxins from boiler operation.	
IC 4	The Operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the exhaust gases in the furnace whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency.	Within 4 months of the completion of commissioning.
IC 5	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of the Selective Non Catalytic Reduction (SNCR) 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 4 months of the completion of commissioning.
IC 6	The Operator shall carry out an assessment of the impact of emissions to air of the following component metals subject to emission limit values; Cd, Hg, As, and Cr (VI). A report on the assessment shall be made to the Environment Agency. Emissions monitoring data obtained during the first year of operation shall be used to compare the actual emissions with those assumed in the impact assessment submitted with the Application. An assessment shall be made of the impact of each metal against the relevant EQS/EAL. In the event that the assessment shows that an EQS/EAL can be exceeded, the report shall include proposals for further investigative work.	15 months from commencement of operations
IC7	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 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.

IC8	A post-commissioning report shall be submitted by the Operator to the Environment Agency for approval on the moisture content of chipped wood The report should provide details of how the moisture content of the waste wood will affect combustion performance, including :- • storage arrangements to ensure appropriate moisture content prior to combustion • appropriate transportation arrangements in order to ensure appropriate moisture content prior to combustion • details of any monitoring that will be carried out in order to ensure appropriate moisture content prior to combustion.	Within 4 months of the completion 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 31 September 2012 to 19 October 2012.Copies of the Application were placed in the Environment Agency Public Register at Apollo Court, Hatfield Office and the St Albans City & District Council Public Register at Civic Centre, St. Peter's Street, St. Albans, Hertfordshire, AL1 3JE.

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

- Food Standards Agency
- Health & Safety Executive
- Hertfordshire Fire & Rescue Service
- National Grid
- Primary Care Trust, NHS Hertfordshire
- Health Protection Agency (now known as Public Health England)
- St Albans City & District Council – Planning
- St Albans City & District Council – Environmental Health

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from **Hertfordshire Fire & Rescue Service** (18/06/13)	
Brief summary of issues raised:	Summary of action taken / how this has been covered
1. The submission is a little vague and does not come with associated drawings.	1. More detailed information is requested as part of pre-operational conditions which will include detailed design and drawings.
2, In general the submission would certainly appear to be a huge step in the right direction. The compartmentation and separation of the stockpiles should reduce any fire to a manageable size and the rotation periods mentioned are adequate to ensure spontaneous combustion does not occur during normal working conditions.	2. No action required.
3, The proposed fire risk management	3. Requested information of detection /

controls are a huge improvement; perimeter fencing bolstered, guards to vehicle exhausts, no smoking and the use of thermal image cameras to monitor the temperature of the stockpiles. What I would ideally like to see, based on the history of this site and the sensitive location, would be an automatic fire detection system and /or suppression system.	suppression systems as part of pre-operational conditions as mentioned above.
4, The proposed water supplies are another improvement and would assist in a rapid attack on any fire.	4. No action required.
5, My main concern is that most of the improvements are based on good management of the site. Without automatic detection and suppression we are reliant on the human factor which we know from experience is fallible. Many of the measures mentioned would require close monitoring to ensure that they are being implemented as per the proposal.	5. Full proposals requested as part of a pre operational condition.

Response Received from **National Grid Asset Protection, Land & Development** (December 2012).	
Brief summary of issues raised:	Summary of action taken / how this has been covered
National Grid requested further copies of the permit application.	Additional copies of the application were sent out. No further comments were received from National Grid.

Response Received from **St Albans City & District Council – Contaminated Land** (24/07/13**)**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No issues raised with regards to the current information; but would like to see Ground Investigation Report once submitted.	The report will be public register once submitted.

Response Received from **Health Protection Agency** (01/10/12) - now Public Health England	
Brief summary of issues raised:	Summary of action taken / how this has been covered
We recommend that any Environmental	Condition 3.2 on fugitive emissions

Permit issued for this site should contain conditions to ensure that the following potential emissions do not impact upon public health: • Emissions to air e.g. fugitive/nuisance dust; • Noise and vibration e.g. machinery and transport; and • Waste disposal and handling e.g. litter and debris. Based solely on the information contained in the application provided to use, the HPA has no significant concerns regarding risk to health of the local population from this proposed facility; providing that the applicant complies with relevant regulatory requirements. However, the Environment Agency (EA) may wish to carry out more detailed assessment and realistic monitoring once the proposed facility is in operation to make sure that potential impact of emissions to the environment and sensitive receptors is minimal. In relation to potential risk to public health we recommend that the EA also consult the following relevant organisation(s) in relation to their areas of expertise: • the Local Authority for matters relating to impact upon human health of contaminated land; noise, odour, dust and other nuisance emissions; • the Food Standards Agency (FSA), where there is the potential for deposition on land used for the growing of food crops or animal rearing; • the Primary Care Trust (PCT) for matters relating to wider public health impacts.	included in permit. And a specific noise condition applies for noise produced by on-site activities, (condition 3.4 of the permit). Noise produced by off-site traffic is not regulated by the permit (Paragraph 4(1)(b) schedule 9 EPR). Monitoring and reporting are a requirement of this permit for air emissions. There are no discharges to surface waters from this installation. The Environment Agency also consulted the following organisations and their comments (if supplied) included in this section of the decision document.

At the time the application was duly made the proposed activities at the site were not deemed to be of High Public interest, and therefore there was no requirement for additional levels of public consultation at that stage.
The site and this application have become High Public Interest during the determination period due to an incident arising on site in November 2012 whilst under the control of a third party (refer section 4.1.2), and this is why this decision is now being consulted on.

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

No responses received.

a) Representations from Local MP, Assembly Member (AM), Councillors and Parish / Town / Community Councils

No responses received.

b) Representations from Community and Other Organisations

No responses received.

c) Representations from Individual Members of the Public

No responses received.

B) Advertising and Consultation on the Draft Decision

This section reports on the outcome of the public consultation on our draft decision carried out between 26/11/13 and 10/01/14.

In some cases the issues raised in the consultation were the same as those raised previously and already reported in section A of this Annex. Where this is the case, the Environment Agency response has not been repeated and reference should be made to section A for an explanation of the particular concerns or issues.

Also some of the consultation responses received were on matters which are outside the scope of the Environment Agency's powers under the Environmental Permitting Regulations. Our position on these matters is as described previously.

1) Consultation Responses from Statutory and Non-Statutory Bodies

A response was received from St Albans City & District Council outlining their concerns that the site should be run to a standard that minimises the risk of future problems particularly in relation to fire and general management.
The Council support the conditions applied to the site by the permit which allow for the control / reduction of environmental risk.

The Council welcome the opportunity to work with the Environment Agency to allow the operation of this activity at this site; and to ensure regulation in line with the permit conditions.

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

a) Representations from Local MP, Assembly Member (AM), Councillors and Parish / Town / Community Councils

Two responses were received from the local MP and a local District Councillor.

Details of the consultation responses and how we have addressed them are as follows:

Consultation Response
The main concerns raised are regarding the ability of Operator to operate the site in accordance with the permit conditions, based on historic management of the site by a different operator (a different legal entity); and the potential risk of fire in the wood storage areas.

Environment Agency (EA) response:
In terms of operator competence we have assessed this in accordance with our guidance RGN No. 1 Understanding the Meaning of Operator, and RGN No. 5 Operator Competence (based on the requirements of the legislation) which considers the technical competence of the operator, their financial status and whether the company or officers of the company have any relevant convictions. We were satisfied at the time of our minded to decision that the operator met the necessary requirements in line with this guidance.

As there have been changes to the structure of the company during the determination period, we have repeated these checks.

The level of technical competence remains unchanged; and no new relevant convictions have been identified.
We requested further information, in the form of a Schedule 5 notice, dated 24 January 2014, from the Applicant to confirm that their financial status is viable for the proposed activity and to confirm that no shareholdings in the company were held on trust for third parties.
The operator provided the requested information and we can confirm that any concerns in respect of operator control and the operator being able to meet the financial obligations of the permit have been addressed to our satisfaction (refer to section 4.3.1).

The permit only authorises the named Operator to control the operation of the Installation. If a new legal entity wishes to operate the Installation in the future an application to transfer the permit would need to be applied for and determined prior to a change of Operator.

The operator will have to continue to demonstrate their competence in operating the site under permit condition 1.1. The site will have to be managed in line with an approved Environmental Management System (EMS). Pre-operational condition PO 01 requires the operator to submit their EMS to the Environment Agency for approval prior to operations commencing.

The risk of a fire starting in the wood storage area is a key issue that we have considered in detail. The operator has provided an initial fire risk management plan, and there is a pre-operational conditional that requires submission of a Fire prevention and Fire response plan for approval by the Environment Agency prior to operations commencing.
We have also placed a lower limit than requested in the Application on the quantity of wood that can be stored on site at any one time. This limit may be increased in future; however this can only be done with the agreement of the Environment Agency, (see section 3 below).

A list of specific issues was also raised in the consultation responses which are listed i) to xi) below, along with our corresponding answer as to how these points are addressed:

i) the site is too small to operate an installation of the size proposed efficiently.
EA response: With the limit on storage quantities and maximum residential times for the unprocessed and processed wood in the permit the throughput of fuel into the boiler will be maintained. Continuous feed is essential for the efficient operation of the boiler and combustion unit along with regular maintenance.

ii) it can never be a Green operation.
EA response: The operation seeks to take waste wood and recover the energy from it by burning the wood as fuel to produce electricity. The waste wood would otherwise be sent to landfill. We are satisfied that the permit will ensure that significant pollution is not caused.

iii) there would be Greenhouse Gas emissions and high pollutant emissions.
EA response: The combustion process does generate gases and pollutants that are emitted to air via a chimney stack. The applicant submitted detailed air quality modelling which has been assessed and we are satisfied with the Applicant's findings that the emissions are below the relevant limits. See section 5.2 of the decision document for further details of the air quality assessment; and sections 6.3 and 6.6 regarding global warming.

iv) many HGV movements for fuel transport to the site and for removal of plant by-products from the site to landfill sites.
EA response: We are unable to regulate the number of vehicle movements to and from the site as this is an issue for the local Planning Authority to consider.

v) there is no water course locally for cooling or scrubbing water, and fans will be needed for cooling which will be noisy
EA response: Water for use in the process will be sourced partly from towns water where clean water is required to prevent contamination; otherwise the operator proposes to use a grey water recycling system. Water is not needed for scrubbing, as a dry scrubbing system will be in place. An improvement condition requires submission of a water balance; whilst permit condition 1.3 requires a water usage efficiency audit every 4 years. We are satisfied with the Applicant's proposals to source the minimum amount of water necessary with the least impact on local supply.

Fans will be required in the form of air cooled condensers; a detailed noise assessment has been submitted and assessed. We agree with the conclusions of the Applicant's assessment that overall noise from the site is unlikely to give rise to complaints at any time of day at any of the noise sensitive receptors.

vi) road access unsatisfactory, even with highway modifications at the nearby lane and main road junctions
EA response: We are unable to comment on the local highway infrastructure in relation to the site; this is an issue for the local Planning authority to consider.

vii) there is no nearby connection to the National Grid
EA response: The Applicant proposes to export electricity to the national grid so we will expect them to establish the necessary connection.

viii) The high powered 400kw National Grid power lines running across the site are vulnerable as the recent fires proved.
EA response: The Operator will have to operate in accordance with our Technical Guidance Note: *Reducing fire risk at sites storing combustible materials*. This technical guidance is incorporated into the permit by way of table S1.2 operating techniques. It requires the operator to set out a site plan identifying vulnerable areas on site and then maintaining a suitable separation distance. A pre-operational conditional requires the submission of a Fire prevention and Fire response plan for approval by the Environment Agency prior to operations commencing. We would expect this plan to include details on minimising risks to the pylon and overhead powerlines.

ix) Air Quality cannot be assured, nor can the fresh water supply which runs adjacent to the site, and has been dug up on at least one occasion.
EA response: The air quality aspect is discussed in point iii) above.
Any activity within the site boundary will be subject to controls under the Operator's environment management system which includes an accident management plan, and the appropriate measures to be taken to minimise any impact on local infrastructure.

x) such operation should only be located where visual and landscape impact are not a critical issue, which they are considered to be in this case, especially with the flue chimney.
EA response: The visual amenity aspect of an operation is subject to consideration by the local Planning Authority.

xi) even with flue gas cleaning of the biomass plant the constant burning of wood at the rate of nearly 7 tonnes per hour 24/7 would constantly produce a direct amount of dangerous pollutants including dioxins which could pose a serious health risk for local residents.
EA response: As discussed above in point iii), and in addition the human health impact is considered in sections 5.2 and 6.4 of this decision document.

b) Representations from Community and Other Organisations

No responses received.

c) Representations from Individual Members of the Public

Two responses were received from individual members of the public.

Details of the consultation responses and how we have addressed them are as follows:

Consultation comment: A concern was raised that one of the gases that would be emitted, hydrogen chloride (HCl), is not listed within table S3.1 as an emission subject to continuous emission monitoring which would be BAT.

EA response: During the determination of the application we assessed information and modelling data relating to the emissions of HCl. After careful consideration we agreed with the applicant's conclusions that this emission screened out and cannot breach the ELVs; therefore it is not a requirement to include continuous monitoring for HCl, but we have set a requirement to do periodic monitoring.
The air quality modelling shows the 1 hour average for HCl of 1.9% of the EAL of 750 $\mu g/m^3$. The background level being 2.5 $\mu g/m^3$ and a process contribution of 14.2 $\mu g/m^3$.

Therefore the proposed contribution screens out at less than 10% of the short term limit; section 5.2 of this decision document discusses this in more detail.

Periodic monitoring will be in place for HCl, and condition 4.3.2 requires the Operator to notify us immediately upon identification of any breaches.

Consultation comment: Concerns were raised on a number of historic issues that have occurred at the site due to mismanagement; including loss of water supply, loss of electricity supply, vehicle movements and blocked roads, odour from stockpiles, fires at the site leading to smoke causing health issues to animals and potentially to human health.

EA response: Historically the site was operated by a separate legal entity. As mentioned in section 2a of these consultation responses, the factors upon which we determine operator competence (mismanagement) were reassessed at the end of the determination process and we are satisfied that the combination of pre-operational conditions, improvement conditions and permit conditions will provide the basis for Operator to demonstrate good operating techniques along with a high level of regulatory control.

Some issues are outside of the Environment Agency regulation, such as off-site vehicle movements and issues relating to the local highways.