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

Decision document recording our decision-making process

The Permit Number is:	EPR/UP3636CX
The Applicant / Operator is:	North Blyth Energy Limited
The Installation is located at:	Battleship Wharf North Blyth Northumberland NE24 1QW

What this document is about

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

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

Preliminary information and use of terms

We gave the application the reference number **UP3636CX**. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we have given to the permit is **UP3636CX**. We refer to the permit as "the **Permit**" in this document.

The Application was duly made on 30/08/2013.

The Applicant is North Blyth Energy Limited. We refer to North Blyth Energy 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 North Blyth Energy Limited "the **Operator**".

North Blyth Energy Limited's proposed facility is located at Battleship Wharf, North Blyth, Northumberland NE24 1QW.   We refer to this as "the **Installation**" in this document.

How this document is structured

- Glossary of acronyms
- Our proposed decision
- How we reached our decision
- The legal framework
- The Installation
    - Description of the Installation and general issues
    - The site and its protection
    - Operation of the Installation – general issues
- Minimising the Installation's environmental impact
    - Assessment Methodology
    - Air Quality Assessment
    - Human Health Risk Assessment
    - Impact on Habitats sites, SSSIs, non-statutory conservation sites etc.
    - Impact of abnormal operations
- Application of Best Available Techniques
    - Scope of Consideration
    - BAT and emissions control
    - BAT and global warming potential
    - BAT and POPs
    - Other Emissions to the Environment
    - Setting ELVs and other Permit conditions
    - Monitoring
    - Reporting
- Other legal requirements
    - The EPR 2010 (as amended) and related Directives
    - National primary legislation
    - National secondary legislation
    - Other relevant EU legislation
    - Other relevant legal requirements
- Annexes
    - Application of the Waste Incineration Directive
    - Pre-Operational Conditions
    - Improvement Conditions
    - Consultation Reponses

Glossary of acronyms used in this document

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

APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous emissions monitor
CFD	Computerised fluid dynamics
CHP	Combined heat and power
COMEAP	Committee on the Medical Effects of Air Pollutants
CROW	Countryside and Rights of Way Act 2000
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
EAL	Environmental assessment level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2010 (SI 2010 No. 675) as amended
EQS	Environmental quality standard
EU-EQS	European Union Environmental Quality Standard
EWC	European Waste Catalogue
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HMIP	Her Majesty’s Inspectorate of Pollution
HPA	Health Protection Agency (now called Health Protection England)
HRA	Human Rights Act 1998
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded

	by IED
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCPD	Large Combustion Plant Directive (2001/80/EC) – now superseded by IED
LCV	Lower calorific value – also termed net calorific value
LOI	Loss on Ignition
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
PEC	Predicted Environmental Concentration
POP(s)	Persistent organic pollutant(s)
PR	Public register
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RGS	Regulatory Guidance Series
SCR	Selective catalytic reduction
SGN	Sector guidance note
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)
SSSI(s)	Site(s) of Special Scientific Interest
TDI	Tolerable daily intake
TEF	Toxic Equivalent Factors
TGN	Technical guidance note
TOC	Total Organic Carbon
UN_ECE	United Nations Environmental Commission for Europe
US EPA	United States Environmental Protection Agency
WFD	Waste Framework Directive (2008/98/EC)
WHO	World Health Organisation
WID	Waste Incineration Directive (2000/76/EC) – now superseded by IED

1 Our decision

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

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

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

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

2 How we reached our decision

2.1 Receipt of Application

The Application was duly made on 30/08/2013. This means we considered it was in the correct form and contained sufficient information for us to begin our determination [but not that it necessarily contained all the information we would need to complete that determination: see below].

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

2.2 Consultation on the Application

We carried out consultation on the Application in accordance with the EPR. 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 placed a paper copy of the Application and all other documents relevant to our determination (see below) on our Public Register Tyneside House, Skinnerburn Road, Newcastle Business Park, Newcastle NE24 7AR.

And also sent a copy to Northumberland County Council, Loansdean, and Morpeth, NE61 2AP for its own Public Register.

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

External consultation bodies
Local Authority – Northumberland County Council
Sewage Undertaker – Northumbrian Water Ltd
Harbour Authority – Blyth Harbour Commission
Port Authority – Port of Blyth
Fisheries – Northumberland Sea Fisheries Committee
Foods Standards Agency
Health and Safety Executive
Public Health England
Director of Public Health
Local Fire Service
National Grid
Natural England

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly.

2.3 Requests for Further Information

We were unable to consider the Application duly made, we required more information in order to determine it, and sent an email requesting further information to allow us to duly make the application 24th July 2013. A copy of the request for further information was placed on our public register and sent to Northumberland County Council local authority for inclusion on its register, as was the response when received 21/08/13.

In addition to the above Request for further information we sent an additional 5 requests RFI 1A,2,3,4 and 5 during the determination dated 22/08/13, 22/10/13, 20/11/13 04/12/13 and 16/12/13, re Installation boundary, Third party use of conveyors, Noise assessment, Unloading of fuel, Compliance with BAT conditions, Abnormal emissions, Low NOx burners, Incoming waste, Furnace requirements, Dioxins – avoidance of de novo synthesis, Efficient combustion/ oxygen levels, Supplementary firing, Waste charging, Standby CEMS and Global Warming Potential and Chlorination in discharge plume. Copies of each request for further information was placed on our public register and sent to Northumberland County Council local authority for inclusion on its register, as was the responses when received.

3 The legal framework

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

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

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

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

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

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

> *“all incineration lines or co-incineration lines, waste reception, storage, on site pre-treatment facilities, waste, fuel and air supply systems, boilers, facilities for the treatment of waste gases, on-site facilities for treatment or storage of residues and waste water, stacks, devices and systems for controlling incineration or co-incineration operations, recording and monitoring incineration or co-incineration conditions.”*

Many activities which would normally be categorised as “directly associated activities” for EPR purposes (see above), 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 “directly associated activities”, which at this Installation includes the generation of electricity using a steam turbine and a back up electricity generator for emergencies, Firewater pumps and Water treatment plant. These activities comprise 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 at Battleship Wharf grid reference NZ 31068 82736 in North Blyth on the Northumberland Coast. To the East of the site is the beach and North Sea and to the West of the site is the River Blyth. The area surrounding the site is a mix of industrial and residential use. Some of the industrial areas are no longer in use but the Port has a long history of industrial use. The main residential areas are Cowpen, Cambois and North Blyth which have been identified as sensitive receptors by the Operator and taken into consideration when carrying out assessments. There are also a number of ecologically sensitive areas; Northumbria Coast SPA/Ramsar, Northumberland Shore SSSI and the River Blyth Estuary Site of Nature Conservation Importance (SNCI) and Local Nature Reserve (LNR).

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

Further information on the site is addressed below at 4.3.

4.1.3 What the Installation does

The Applicant has described the facility as generation of heat and electricity through the combustion of virgin biomass and waste wood. 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 never the less ‘co-incineration’ because it is considered that main purpose of this plant is the generation of energy.

The Installation will comprise fuel storage buildings to the north and south of a power plant area (referred to as the Power Island) that will consist of buildings that provide an envelope containing the boiler, flue gas abatement, steam turbine, control and administrative areas. The Power Island will comprise a Circulating Fluidised Bed (CFB) boiler, a steam turbine and generator. A once-through water cooling system, a water treatment plant, ash storage structures, ancillary equipment and instrumentation will also be installed. The water treatment plant will treat towns (i.e. mains) water to provide make-up to the boiler water system. A 105m stack will discharge the flue gas emissions from the CFB boiler.

Electricity will be exported via a 66 kV underground cable circuit to the existing Northern Powergrid substation to the north west of the Installation. The annual availability of the Installation is anticipated to be in the order of 92%, assuming 4% of the year will be planned outages and a further 4% will be forced outages. This equates to approximately 8,000 hours of operation each year.

The Installation will use approximately 500,000 to 1,000,000 tonnes per year of virgin biomass (800,000 tonnes) and waste wood (200,000) fuel. A range of expected annual fuel consumption has been provided as the fuel will vary in moisture content and calorific value. The Installation will use primarily wood based biomass fuel in the form of wood chip, pellet or briquette. These will be produced from sustainably sourced domestic or imported forestry material including residues and dedicated energy crops. The biomass fuel will include non-recyclable waste wood and also non-recyclable paper and cardboard that may otherwise be land filled. Other biomass fuels, used to a lesser extent, will include agricultural residues (such as those from olive and sunflower processing). All biomass fuel will comply with current and future relevant UK Government sustainability requirements and reporting criteria as currently set out in the Renewables Obligation (RO) Order 2009 [Ref iv] and administered and regulated by Ofgem and Article 17 of the Renewable Energy Directive (2009/28/EC). The intention is to source fuels from indigenous sources, where possible taking into account commercial and sustainability parameters.

The use of non-recyclable waste wood as a proportion (on an annual basis up to 30%, although this may be up to 100% on occasion) of the fuel in the Installation will require it be subject to IED chapter IV provisions for waste incineration and co-incineration, meaning stringent constraints and controls with an intensive monitoring regime to ensure that the combustion plant remains in compliance with the set Emission Limit Values at all times.

Fuel Receipt, Storage and Handling
The biomass fuel delivered to site will have undergone off site processing to reduce particle size and remove metal contaminants. Assessment of the biomass to be used as fuel in the Installation will be undertaken prior to its delivery to ensure the risk of unsuitable materials being combusted is minimised. Provided the biomass is of an acceptable type and is accompanied by the appropriate documentation, it will be formally accepted by NBEL.

Biomass will be screened on site with the use of magnets above a conveyor to remove tramp metal and oversize screens to remove oversize material. Material removed by the processing plant will be discharged by chutes into skips at ground level.

Rail deliveries will arrive through the existing Battleship Wharf rail network onto the site and offloaded onto a conveyor system and forwarded to the fuel stores. Offloaded fuel will be weighed on belt scales on the way to store in order to determine the delivered tonnage.

Ship deliveries will be offloaded by the use of the existing Port of Blyth cranes operated by Port of Blyth personnel and transferred onto conveyors via mobile hoppers and forwarded to the fuel stores. Offloaded fuel will be weighed on belt scales on the way to store in order to determine the delivered tonnage.

All fuel delivery road vehicles will be weighed upon arrival at the site with the use of a weighbridge (and upon leaving), after which they will be directed to the unloading point.

All biomass fuels will be stored within enclosed buildings that will allow the fuel to be kept dry and contained. There will be sufficient fuel storage capacity for continuous operation of the Installation for around 20-30 days. Following acceptance, it is intended that the virgin biomass and non-recyclable waste wood will be segregated by grade and quality and stored in dedicated demarcated storage piles in the fuel storage buildings. Higher dust generating fuels, such as wood pellets, will be stored within buildings fitted with appropriate ventilation facilities. Procedures for the safe management and storage of the fuel will be included in the formal Environmental Management System covering operations at the Installation. In addition, supporting fuel – oil will be stored in storage tanks and will be designed and operated in compliance within the parameters of the relevant regulations (Control of Pollution (Oil Storage) (England) Regulations 2001).

Fuel will be reclaimed from the fuel stores by suitable automatic reclaim systems or driver operated front load shovels. Fuel supply to the boiler and blending of any fuel mixtures will be controlled to ensure stable and even combustion to help maintain the correct temperature and compliance with the Emission Limit Values.

Fuel Combustion
The biomass fuel will be combusted in a CFB boiler located within the boiler building to produce heat that will be used to heat water and produce high pressure steam. The steam will then be passed to the steam turbine and generator to generate electricity.

There will also be an emergency diesel generator that will be used infrequently if required due to problems with the main power generation plant (and tested weekly for up to 10 minutes at a time).

Gas oil will be used during periods of boiler shutdown and start-up and to ensure maintenance of combustion temperature while operating on non-recyclable waste wood. Good combustion controls associated with the boiler will ensure an optimum compromise between: emissions of oxides of nitrogen and carbon monoxide; carbon in ash; and thermal efficiency. Carbon monoxide emissions and levels of carbon in ash will be controlled by maintaining sufficient oxygen levels to ensure complete oxidative combustion and destruction of organic species.

Power Generation and Export
Electricity will be generated through the expansion of the high pressure steam within the steam turbine, driving an electrical generator. The steam turbine will be designed for continuous operation. Steam pressure will be regulated by computer controlled governor valves allowing steam into the turbine. The steam turbine will generate approximately 109 MWe of electricity in total from the high pressure steam produced by the boiler. The Installation will consume approximately 9 MWe, leaving approximately 99.9 MWe available for export to the National Grid. Electricity will be exported from the plant via 66 kV underground cables to the location of the Northern Powergrid substation which is adjacent to the National Grid substation at the former Blyth Power Station, a distance of approximately 1.7km.

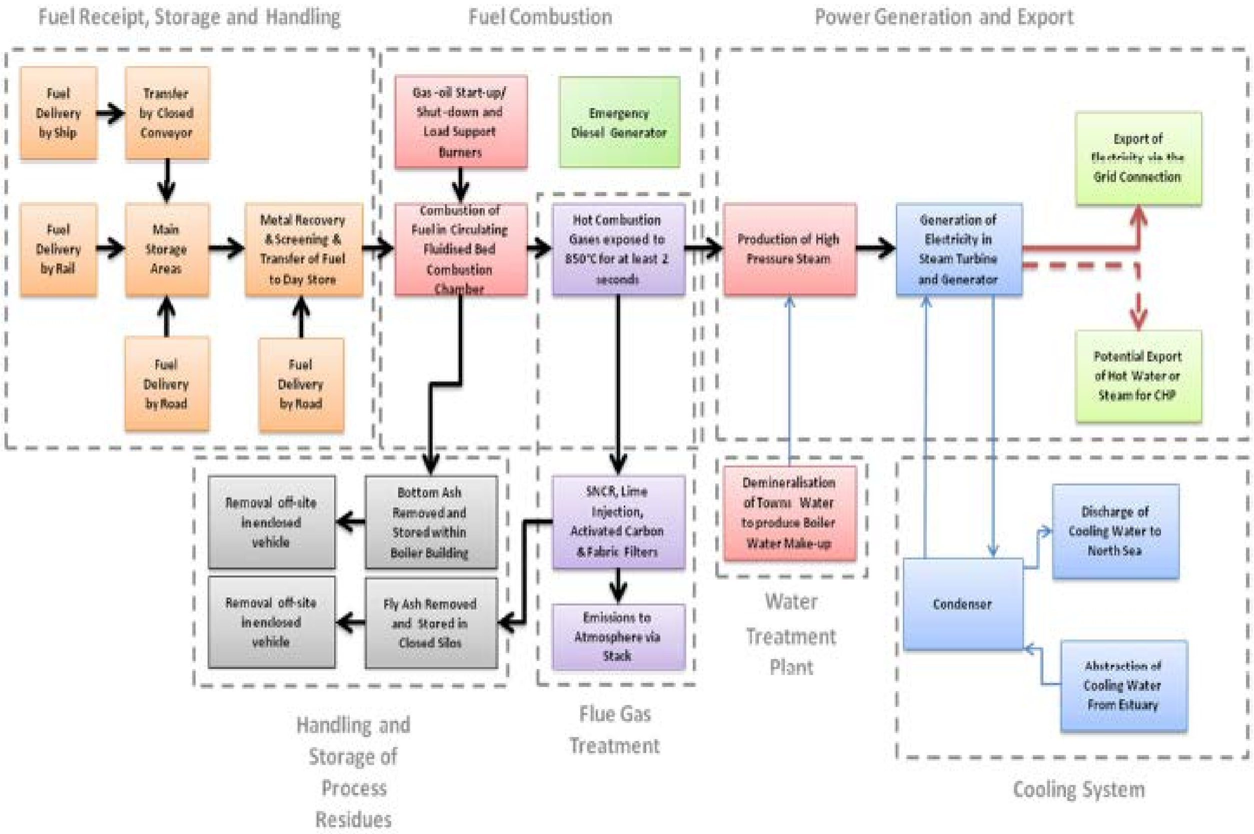
Flue Gas Treatment
Flue gases from the boiler will be cleaned before they are released into the atmosphere via the stack. The flue gas will exit the chimney stack at 105m (taking into account dispersion and visual impact requirements) at a temperature of around 136°C and appropriate velocities will be maintained to ensure adequate dispersion. The stack will incorporate sampling points for manual measurements and connections for continuous emissions monitoring equipment.

Water Treatment Plant
Water quality in the boiler water/steam circuit will be controlled by continuously removing or 'blowing down' small quantities of the water/steam from the system to prevent build up of impurities in the system. This boiler blow-down water will be replaced with demineralised water produced by a water treatment plant. This will treat mains water to produce water of the appropriate quality. The exact technology will be chosen at the detailed design stage.

Cooling System
Exhaust steam from the steam turbine will be condensed in a water-cooled condenser for re-use within the steam cycle. It is proposed that water from the River Blyth Estuary will cool the condenser and will then be discharged into the North Sea. The cooling water intake will be located in space below the existing concrete decked open quay (Berth 4) at Battleship Wharf, thereby avoiding creating an obstruction to shipping. The

cooling water will be treated with small concentrations of a biocide (to control growth of micro-organisms in pipe work and heat exchangers). Biocide concentrations in the cooling water will be monitored prior to discharge.

Process Flow Diagram



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

Waste throughput, Tonnes/line	1,000,000tonnes /annum	125tonnes/hour
Waste processed	Virgin wood, wood waste.	
Number of lines	1	
Furnace technology	Fluidised Bed Combustion (FBC)	
Auxiliary Fuel	Gas Oil	
Acid gas abatement	Dry	Hydrated lime
NOx abatement	SNCR	Ammonia
Reagent consumption	Auxiliary Fuel 2400 te/annum Ammonia : 740 m^3/annum (25% solution) Lime/Other : 1080 te/annum Activated carbon: 215 te/annum Process water: 70,000 te/annum	
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon	
Stack	Height, 105m	Diameter, 3.6m
Flue gas	Flow,153.6 Nm^3/s	Velocity14.5m/s
Electricity generated	109MWe	MWh 872,000
Electricity exported	99.9MWe	MWh 799,200

4.1.4 Key Issues in the Determination

The key issues arising during this determination were Emissions to Air, water, Habitats and noise 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 Installation site is located on the spit of land between the River Blyth Estuary and the North Sea, within the southern half of the Port of Blyth's Battleship Wharf. This area comprises an approximately rectangular strip of land orientated north northwest to south southeast on its long axis. An underground cooling water outfall pipe also forms part of the Installation, projecting eastwards from the Installation into the North Sea. The Installation site is located at National Grid Reference NZ 31068 82736 at an elevation of approximately 5m above Ordnance Datum (aOD) and will cover approximately 11.5 hectares (ha).

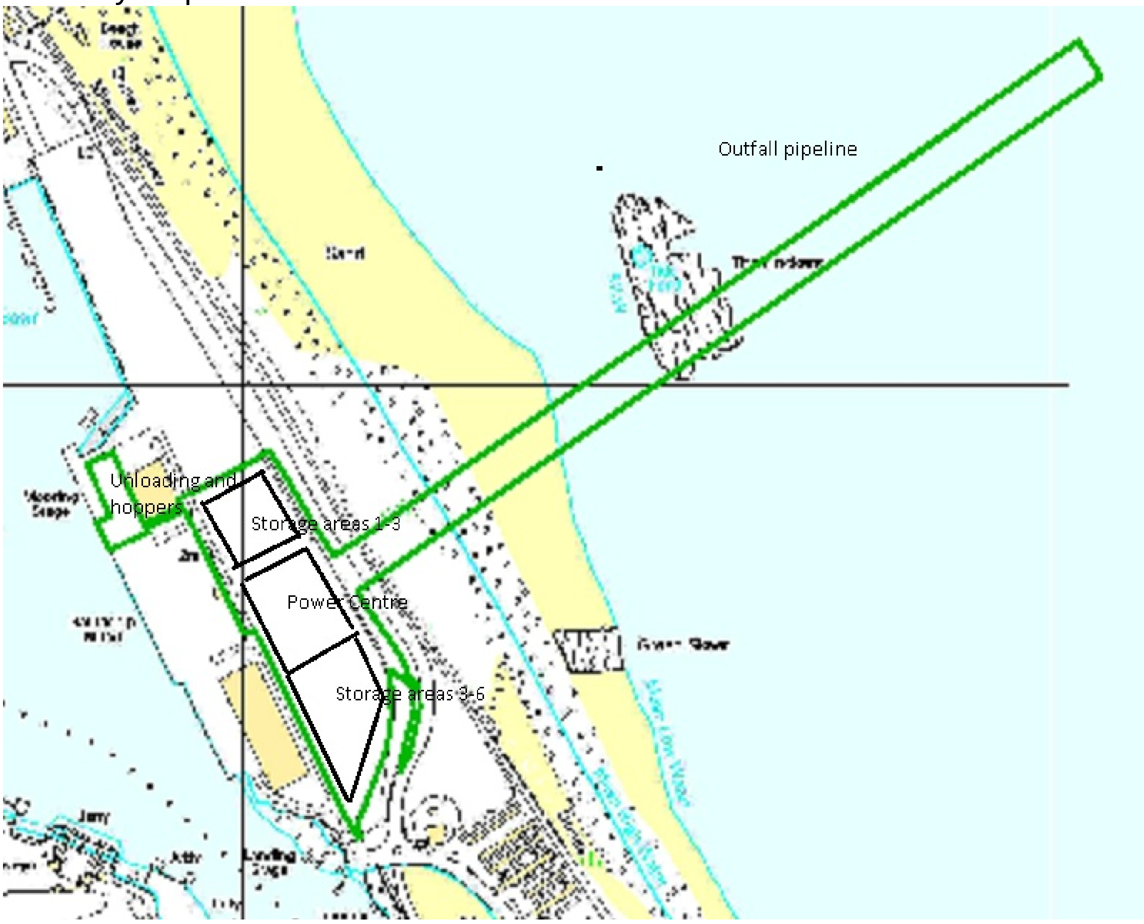
The surrounding land uses in the vicinity of the Installation site are as follows:

- To the north west of the Installation Site is the location of the former Blyth Power Station, now demolished, with the southern part of the former Blyth Power Station site occupied by a National Grid (NGET) substation located within a large shed structure. Adjacent to NGET substation is the existing Northern Powergrid substation which is housed in a brick building.
- To the east of the Installation Site is an area of sand dunes and beach with the North Sea beyond.
- The area to the south west, across the River Blyth Estuary, forms the former Bates Colliery which has been partly redeveloped by the Coal Authority as a water treatment facility for mine water.
- To the south east of the Site is the residential area of North Blyth, the closest dwelling being approximately 140m from the Installation boundary. On the south side of the Blyth Estuary the nearest residential properties of Blyth are located approximately 280m from the boundary of the Installation. Residential properties are also located approximately 500m to the northwest of Installation at Cambois.

The installation layout comprises, to the north west of the site and abutting the river Blyth, Ship unloading area with conveyors to the north east of the site to storage areas, there are also storage areas to the south east of the site and between these two areas is the Power Centre consisting of:

- Boiler building
- Steam turbine building
- Water treatment plant
- Screening and storage areas
- Stack
- Control room and maintenance workshop

Basic layout plan



Historically the site located at Cambois Links comprising heath and sough grassland there has been activity on this site since the 1860's, in the form of a track, Public House and a number of buildings. From that day to present day the area has been developed to accommodate the Blyth Power Station, coal industry, ship breakers yards jetties and further residential properties. In the 1960's there was evidence of an Ash barge dock and spoil heaps, expansion of Blyth Power Station. In the 1980's a new grain depot is located at Quay 35. In the Year 2000 various reclamation works were carried out by Northumberland County Council.

4.2.2 <u>Proposed site design: potentially polluting substances and prevention measures</u>

The operator intends to operate the site using ISO14001, incorporating staff competence training, management and operational procedures including an accident management plan and incident response. All facilities will be new and constructed in accordance with BAT requirements. All oil storage facilities will meet the requirements of the Control of Pollution (Oil Storage) (England) Regulations 2001. Spill kits will be available and staff will be trained in their use. Surface water drainage will be discharged to the River Blyth

Estuary. Surface water drainage from areas potentially contaminated by oil (e.g. road runoff) will pass through Class 1 oil interceptor prior to discharge. Oil interceptors will be designed to remove oil and produce effluent containing no visible oil prior to discharge to the River Blyth Estuary. The Installation Site will be covered by hardstanding areas and buildings, with management of new and existing areas of grass and wildflower areas, created for terrestrial ecology enhancement. Impervious surfaces and suitable containment will be utilised in areas where potentially contaminative materials are to be stored. An inspection and maintenance programme will be put in place for impervious surfaces and containment kerbs across the Installation Site. All wastes will be stored in designated areas with suitable secondary containment awaiting recovery or disposal at suitably licensed sites. It is proposed that at least one generator transformer and auxiliary transformer will form part of the Installation. All electrical transformers at the Installation will be constructed in accordance with BAT to prevent any releases to ground.

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 submitted a site condition report which includes a report on the baseline conditions as required by Article 22. We have reviewed that report and consider that on the whole the report adequately describes the condition of the soil and groundwater prior to the start of operations; however we have informed the operator that they should consider putting more boreholes/test pits across the site to ensure they are fully aware of all historical pollution across the site. An updated SCR was submitted on the 27/11/13 removing some of the gaps in baseline data that was highlighted to the operator during this determination process.

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 Application and Supporting Documents, Appendix A Application Site Condition Report of the Application. Pre-operational condition PO1 requires the Operator to have an Environmental Management System in place before the Installation is operational, and this will include a site closure plan.

At the definitive cessation of activities, the Operator has to satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or 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

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation.

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

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

4.3.2 Management

The Applicant has stated in the Application that they will implement an Environmental Management System (EMS) that will be certified under ISO14001. A pre-operational condition (PO1) is included requiring the Operator to provide a summary of the EMS prior to commissioning of the plant and to make available for inspection all EMS documentation. The Environment Agency recognises that certification of the EMS cannot take place until the Installation is operational. An improvement condition (IC1) is included requiring the Operator to report progress towards gaining accreditation of its EMS.

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

4.3.3 Site security

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

4.3.4 Accident management

The Applicant has not submitted an Accident Management Plan. However, having considered 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 (PO1).

4.3.5 Off-site conditions

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

4.3.6 Operating techniques

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

Description	Parts Included	Justification
The Application EPR/UP3636CX/A001	Application including sections 1-4, figures 1-5 and Appendix A and B	Provides details of requirements for operation of plant.
RFI – 1, Response to request for further Information pre duly made, dated 24/07/13	All - Installation boundary, Third party use of conveyors, Noise assessment, Unloading of fuel, Compliance with BAT conditions	Unable to duly make without this information.
Further response to above request 24/07/13	All - Waste codes, EMS, water abstraction and discharge.	Responses not required pre duly making but addressed in the previous RFI.
RFI – 1A 22/08/13	All – PCB,s, Nitrogen deposition	Response dated 30/08/13
RFI – 2 22/10/13	All – abnormal emissions, raw material management, furnace requirements, dioxins and avoidance of de novo synthesis, oxygen levels during combustion, supplementary burners, Use of low NOx burners, Waste charging and validation of combustion conditions, BAT compliance.	Response dated 05 and 06/11/13
RFI – 3 20/11/13	All – Low NOx burners, noise re by pass stacks, reagents to be used and quantities, flue gas recirculation.	Response dated 26/11/13
RFI – 4 04/12/13	All – standby CEMS,	Response dated 19/12/13

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 raw materials and fuels:

Raw Material or Fuel	Specifications	Justification
Gas Oil	< 0.1% sulphur content	As required by Sulphur Content of Liquid Fuels Regulations.

Article 45(1) of the IED requires that the Permit must include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2005/532/EC, EC, if possible, and containing information on the quantity of each type of waste, where appropriate. The Application contains a list of those wastes coded by the European Waste Catalogue (EWC) number, which the Applicant will accept in the waste streams entering the plant and which the plant is capable of burning in an environmentally acceptable way. We have specified the permitted waste types, descriptions and where appropriate quantities which can be accepted at the installation in Table S2.2. The operator originally applied for 02 01 99, 03 01 99, 03 03 99, after discussion with the operator explaining that they would need to give specific details of the waste to be burnt under the 99 code, as the operator was unable to do this they withdrew the 99 codes. They also withdrew 20 02 01 at the same time. All other codes applied for are in table S2.2 of the permit and are deemed acceptable for this plant.
We are satisfied that the Applicant can accept the wastes contained in Table S2.2 of the Permit because: -

- (i) these wastes are categorised as municipal waste in the European Waste Catalogue or are non-hazardous wastes similar in character to municipal waste;
- (ii) the wastes are all categorised as non-hazardous in the European Waste Catalogue and are capable of being safely burnt at the installation.
- (iii) these wastes are likely to be within the design calorific value (CV) range for the plant;
- (iv) 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 1,000,000 tonnes per annum. This is based on the installation operating 8000 hours per year at a nominal capacity of 125 tonnes per hour. This is anticipating a 92% availability, 4% planned outage and 4% unplanned outage per year. We have further restricted the operation of the plant by limiting the throughput of wastes to non-recyclable waste wood 20% per year.

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

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

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

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

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

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

(ii) Use of energy within the Installation

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

The Application details a number of measures that will be implemented at the Installation in order to increase its energy efficiency,

NBEL will incorporate energy efficiency objectives into the EMS, which will aim to:

- ensure the purchase of energy efficient equipment;
- maintain and operate equipment in an efficient manner;
- continually review the operation and identify operations or practices that would result in improved energy efficiency; and
- undertake periodic reviews of the operation with the aim of identifying areas or practices that would result in improved energy efficiency.

As a new plant, the proposed Installation will be designed for the highest practical energy efficiency.

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 872kWh/tonne. The installation capacity is 1,000,000 t/a.

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

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

The BREF says that it is BAT to reduce the average installation electrical demand to generally below 150 kWh/tonne of waste with an LCV of 10.4 MJ/kg. The LCV in this case is expected to be 12.6 MJ/kg (based on operator's average). Taking account of the difference in LCV, the specific energy consumption in the application is above the expected process energy demand for Municipal waste Incinerator, as this installation is burning biomass which has a higher calorific, and the electrical demand is lower than that of a MWI we are satisfied that this installation meets BAT according to the BREF guidance.

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

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

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

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

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

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

The Installation will generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. The Sankey diagram emailed to us dated 14/10/13 which shows 109 MW of electricity produced for an annual burn of 1,000,000 tonnes, which represents 10.9 MW per 100,000 tonnes/yr of waste burned (0.872 MWh/tonne of waste). The Installation is therefore in line with the BREF taking into account the difference in calorific values between the materials burnt (MWI 10.4, Biomass 12.6)

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

The location of the Installation largely determines the extent to which waste heat can be utilised, and this is a matter for the planning authority. The Applicant carried out a feasibility study, with Northumberland County Council which showed there was potential to provide district heating to local businesses; suitable opportunities have been explored, though there are no firm commitments at this stage. There is provision within the design of the steam turbine to extract low-grade steam for a district heating scheme. Establishing a district heating network to supply local users would involve significant technical, financial and planning challenges such that this is not seen as a practicable proposition at present.

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

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

(v) R1 Calculation

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

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

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

(vi) Choice of Steam Turbine

As a new development the proposed Installation will be designed for the highest practical energy efficiency. Electricity will be generated through the expansion of the high pressure steam within the steam turbine, driving an electrical generator. The steam turbine will be designed for continuous operation. Steam pressure will be regulated by computer controlled governor valves allowing steam into the turbine. The steam turbine will generate approximately 109 MWe of electricity in total from the high pressure steam produced by the boiler. The Installation will consume approximately 9 MWe, leaving approximately 99.9 MWe available for export to the National Grid. Electricity will be exported from the plant via 66 kV underground cables to the location of the Northern Powergrid substation. The design of the steam turbine will allow steam to be extracted at various intermediate pressures to provide heat for internal use or to export steam or hot water. After passing through the steam turbine, the resulting low pressure steam will be exhausted to a condenser.

(vii) Choice of Cooling System

The preferred cooling solution for the Installation is a once-through cooling water system owing to the benefits it offers in respect of efficiency, low noise and compact site configuration. Water supply is readily available from the river Blyth Estuary. As the use of once-through cooling has no significant impacts with respect to aquatic ecology, the benefits of a lower water demand and discharge associated with cooling towers or air cooled condenser were not considered in this case to outweigh the reduction in plant efficiency.

It is proposed that water from the River Blyth Estuary will cool the condenser and will then be discharged into the North Sea. The cooling water intake will be located in space below the existing concrete decked open quay (Berth 4) at Battleship Wharf, thereby avoiding creating an obstruction to shipping. The selection of cooling system and location of intake and outfall pipes along with the need for biocide treatment have been assessed and those selected are identified as the current Best Available Techniques. The cooling water will be treated with small concentrations of a biocide (to control growth of micro-organisms in pipe work and heat exchangers). Biocide concentrations in the cooling water will be monitored prior to discharge. Exhaust steam from the steam turbine will be condensed in a water-cooled condenser for re-use within the steam cycle

The once through cooling system is the preferred option for this installation with regards to the overall plant efficiency, low noise and compact configuration of the site.

(vii) Permit conditions concerning energy efficiency

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

The Operator is required to report energy usage and energy generated under condition 4.2 and Schedule 5. The following parameters are required to be reported: total electrical energy generated; electrical energy exported; total energy usage and energy exported as heat (if any). Together with the total MSW burned per year, this will enable the Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency is less than proposed.

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

4.3.8 Efficient use of raw materials

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

The Operator is required to report with respect to raw material usage under condition 4.2. and Schedule 5, including consumption of lime, activated carbon and /ammonia used per tonne of waste burned. This will enable the Environment Agency to assess whether there have been any changes in the efficiency of the air pollution control plant, and the operation of the 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 condition 4.2.1. Optimising reagent dosage for air abatement systems and minimising the use of auxiliary fuels is further considered in the section on BAT.

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

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

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 S3.4 specify limits for loss on ignition (LOI) of <5% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

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

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

In order to ensure that the IBA and APC residues are adequately characterised, pre-operational condition PO3 requires the Operator to provide a written plan for approval detailing the ash sampling protocols. Table S3.4 requires the Operator to carry out an ongoing programme of monitoring.

The ash resulting from the fuel combustion process has the potential to be a useful by-product generated by the Installation and NBEL is investigating the feasibility of utilising these as a product, rather than disposal of the ash via landfill.

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 Section 4 of the application and supporting documents and also chapter 7 of their environmental statement which forms part of their submission for this application. The assessment comprises:

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

Of these the amenity impacts during construction and air quality impacts arising from additional road traffic have not been considered as these are essentially matters for the local planning authority when considering the parallel application for planning permission, and outside the scope of our determination under the Environmental Permitting Regulations.

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 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 two weather stations that could be considered to be representative for this assessment: Boulmer and Newcastle weather stations. To ensure a worst case approach, five years of hourly sequential data (2004 – 2008) were used from both weather stations. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

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

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

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

Information on baseline air quality in the vicinity of the Project was obtained or derived from a range of sources. Where local air quality monitoring data were available, this information was reviewed. Where no local information was available other appropriate sources of information were reviewed to obtain a representative assessment of local background air quality.

The following sources of information have been used to obtain information on baseline air quality:

- maps of background concentrations for each 1 km x 1 km grid square in the UK produced by Defra and available via the UK Air Quality Archive [Ref 7.20]. These estimates are based upon the principal local and regional sources of emissions, and ambient monitoring data. The grid square covering the Facility Site location and the maximum concentration from all grid squares covering the study area were included; and the 2010 Air Quality Progress Report prepared by NCC as part of the Council's obligations under the LAQM process [Ref 7.21].

- limited monitoring of trace metals is undertaken at a small number of sites across the UK. The UK Trace Metals Monitoring Network [Ref 7.22] has been reviewed to obtain representative background data. Similarly, data from the UK's Toxic Organic Micropollutant network were used to provide an indication of likely background levels of dioxins and furans;

- background levels of ammonia and hydrogen chloride were obtained from the CEH UK Pollutant Deposition Website [Ref 7.23].

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	μg/m^3		μg/m^3	μg/m^3	% of EAL	μg/m^3	% of EAL
NO_2	40 200	1 2	29.6 59.2	0.76 27.6	1.90 13.8	30.4 86.8	75.9 43.4
PM_{10}	40 50	1 3	23.5 40.3	0.05 0.05	0.13 0.10	23.6 40.35	58.9 80.7
$PM_{2.5}$	25	1	8.2	0.054	0.22	8.25	33.0
SO_2	266 350 125	4 5 6	20.7 20.7 20.7	56.4 38.7 11.9	21.2 11.06 9.5	77.1 59.4 32.6	29.0 17.0 26.1
HCl	750	7	0.66	16.5	2.2	17.2	2.29
HF	16 160	8 7	2 4	0.005 1.1	0.03 0.6875	2.005 5.10	12.53 3.2
CO	10000	9	154	18.3	0.18	172	1.7
TOC	2.25	1	0	0.05	2.22	0.050	2.22
PAH	0.00025	1	0	0.000011	1.10	0.000011	1.1
NH3	180	1	1.4	0.054	0.03	1.45	0.81
	2500	10	2.7	2.7	0.11	5.4	0.2
PCBs	0.2	1	1.00E-08	5.40E-11	0.03	1.01E-08	0.00
	6	10	1.00E-08	5.40E-11	0.02	1.01E-08	0.0
VOC	5	1	0	0.05	1.00	0.05000	1.0
Dioxins			1E-08	5.40E-10		1.05E-08	

TOC as 100% 1,3 butadiene
PAH as benzo[a]pyrene
VOC as 100% benzene

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

This data is summarised in the Application and has been used by the Applicant to establish the background (or existing) air quality against which to measure the potential impact of the co-incinerator.

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

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

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

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

5.2.1 Assessment of Air Dispersion Modelling Outputs

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

(i) Screening out emissions which are insignificant

From the 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:

Pollutant	**EQS / EAL**		**Back-ground**	**Process Contribution (PC)**		**Predicted Environmental Concentration (PEC)**	
	µg/m³		**µg/m³**	**µg/m³**	**% of EAL**	**µg/m³**	**% of EAL**
PM_{10}	40 50	1 3	23.5 40.3	0.05 0.05	0.13 0.10	23.6 40.35	58.9 80.7
$PM_{2.5}$	25	1	8.2	0.054	0.22	8.25	33.0
HF	16 160	8 7	2 4	0.005 1.1	0.03 0.6875	2.005 5.10	12.53 3.2

CO	10000	9	154	18.3	0.18	172	1.7
NH3	180	1	1.4	0.054	0.03	1.45	0.81
PCB's	2500	10	2.7	2.7	0.11	5.4	0.2
	0.2	1	1.00E-08	5.40E-11	0.03	1.01E-08	0.00
	6	10	1.00E-08	5.40E-11	0.02	1.01E-08	0.0

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

Pollutant	**EQS / EAL**		**Back-ground**	**Process Contribution (PC)**		**Predicted Environmental Concentration (PEC)**	
	µg/m^3		**µg/m^3**	**µg/m^3**	**% of EAL**	**µg/m^3**	**% of EAL**
NO_2	40	1	29.6	0.76	1.90	30.4	75.9
	200	2	59.2	27.6	13.8	86.8	43.4
SO_2	266	4	20.7	56.4	21.2	77.1	29.0
	350	5	20.7	38.7	11.06	59.4	17.0
	125	6	20.7	11.9	9.5	32.6	26.1
HCl	750	7	0.66	16.5	2.2	17.2	2.29

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

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

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

The above assessment also shows that the predicted process contribution for emissions of $PM_{2.5}$ is also below 1% of the Environmental Quality Objective. Therefore the Environment Agency concludes that particulate emissions from the installation, including emissions of PM_{10} or $PM_{2.5}$, will not give rise to significant pollution.

There is currently no emission limit prescribed or 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. HF has 2 assessment criteria – a 1-hr EAL and a monthly EAL – the process contribution is <1% of the monthly EAL and so the emission is insignificant if the monthly EAL is interpreted as representing a long term EAL.

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

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 table above shows that for CO using an 8hour running mean, the PC is less than 1% of the EQS. The applicant did not model against the hourly standard however our check modelling showed there was a low risk of CO being significant when compared to the hourly standard of 30,000µg/m3. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of this substance to be BAT for the Installation.

The Applicant has used the EQS for Benzene for their assessment of the impact of VOC (conservatively assuming VOC's comprised 100% benzene). This was then compared to the benzene EQS and showed the long term PC was less than 1% and therefore screened out as insignificant. 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.

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.

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.

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, see table below
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 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.

The following emissions of metals have not screened out at the first stage of the H1 screening tool and will require further assessment taking into account background levels.

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.

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	1	0.0002	0.00014	2.8	0.00034	6.8
Tl			0.00083	0.00014		0.00097	
Hg	0.25	1	0.0021	0.0003	0.12	0.00240	0.96

	7.5	2	0.0041	0.014	0.19	0.01810	0.241
Sb	5	1	0.0013	0.0003	0.01	0.0016	0.03
	150	2	0.0027	0.015	0.01	0.01770	0.012
Pb	0.25	1	0.0097	0.0003	0.12	0.01000	4.00
Co			0.00067	0.0003		0.00097	
Cu	10	1	0.0058	0.0003	0.00	0.0061	0.061
	200	2	0.012	0.015	0.01	0.02700	0.014
Mn	0.15	1	0.0089	0.0003	0.20	0.0092	6.13
	1500	2	0.018	0.015	0.00	0.03300	0.0022
V	5	1	0.0017	0.0003	0.01	0.002	0.04
	1	3	0.0035	0.0057	0.57	0.00920	0.92
As	0.003	1	0.00054	0.0003	10.00	0.00084	28.0
Cr (II)(III)	5	1	0.0019	0.0003	0.01	0.00220	0.044
	150	2	0.0038	0.015	0.01	0.01880	0.0125
Cr (VI)	0.0002	1	0.00009	0.00002	10.00	0.00011	55.0
Ni	0.02	1	0.00078	0.0003	1.50	0.00108	5.4

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

The above table shows using the above criteria Hg, Sb, Pb, Co, Cu, Mn, V and Cr (ii)(iii) have all screened out as being under 1% long term or 10% short term of the EAL/EQS. The table also shows that those metals Cd, As, Cr(VI) and Nickel which did not screen out require further assessment to determine whether exceedences of the relevant EQS are likely. This is done by taking into account the background and the PC, giving the process environmental concentration. Where a PEC is <100% no further assessment is required and the impact is unlikely to give rise to significant pollution.

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, and that the above assessment is an over prediction of the likely impact We therefore agree with the Applicant's conclusions.

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

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

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

Based on this data, we consider it remains a conservative assumption for the Applicant to consider that the Cr(VI) emission concentration will be 0.00002 mg/m^3.

The Applicant has used the above data to model the predicted Cr(VI) impact. The PC is predicted as 7.5 %, the PEC is predicted as 54%.

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

We agree with the Applicant's conclusions.

5.2.4 Consideration of Local Factors

This site is situated on the North East Coast of England on a spur of land between the River Blyth and the North Sea. The prevailing wind is from the west. The emission point to air from the Installation has been designed to provide a balance between competing factors:

- adequate dispersion of emissions; and,
- visual impact.

A stack height of105m has been selected for the Installation in consideration of these factors and following detailed atmospheric dispersion modelling. The air quality impact assessment demonstrates that this height provides adequate dispersion of the emissions from the process such that its operation will not lead to any unacceptable impact on nearby human and ecological receptors. The assessment concludes that with a stack of 105m, impacts on local air quality will be negligible.

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

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

5.3 Human health risk assessment

5.3.1 Our role in preventing harm to human health

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

i) Applying Statutory Controls

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

The main conditions in an EfW permit are based on the requirements of the IED. Specific conditions have been introduced to specifically ensure compliance with the requirements of Chapter IV. The aim of the IED is to prevent or, where that is not practicable, to reduce emissions to air, water and land and prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole. IED achieves this aim by setting operational conditions, technical requirements and emission limit values to meet the requirements set out in Articles 11 and 18 of the IED. These requirements include the application of BAT, which may in some circumstances dictate tighter emission limits and controls than those set out in Chapter IV of IED on waste incineration and co-incineration plants. The assessment of BAT for this installation is detailed in section 6 of this document.

ii) Environmental Impact Assessment

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

iii) Expert Scientific Opinion

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

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

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

Policy Advice from Government also points out that the minimal risk from modern incinerators. Paragraph 22 (Chapter 5) of WS2007 says that "research carried out to date has revealed no credible evidence of adverse health outcomes for those living near incinerators." It points out that "the relevant health effects, mainly cancers, have long incubation times. But the research that is available shows an absence of symptoms relating to exposures twenty or more years ago when emissions from incinerators were much greater than is now the case." **Paragraph 30 of PPS10** explains that "modern, appropriately located, well run and well regulated waste management facilities should pose little risk to public health."

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

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

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

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

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

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

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

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

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

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

iv) Health Risk Models

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

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

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

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

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

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

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

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

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

v) Consultations

As part of our normal procedures for the determination of a permit application, we would consult Public Health England and Director of Public Health, and FSA. In this case PHE responded. All issues raised by these consultations are considered in determining the application as described in Annex 4 of this document.

5.4 Assessment of Intake of Dioxins and Furans

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

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

The results of the Applicant's assessment of dioxin intake are detailed in the table below. 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. The highest recorded exposure was Infant HMEI (Hypothetically maximally exposed individuals at 4.6% of the UK long-term recommended Tolerable Daily Intake of 2pg TEQ/kgBW/Day all other receptors recorded exposures of below 1% of the UK long-term recommended Tolerable Daily Intake of 2pg TEQ/kgBW/Day.

Estimated exposure levels from the project

Case	Maximum Estimated Exposure pg TEQ/day	Average Body Weight Kg	Daily Exposure per Unit Body Weight pg TEQ/kgBW/Day	% of UK long-term Recommended Tolerable Daily Intake of 2 pg TEQ/kgBW/Day
Adult HMEI	0.4	70.1	0.01	0.5%
Adult Resident	0.03	70.1	0.0008	0.04%
Adult Farmer	0.014	70.1	0.0004	0.02%
Child HMEI	0.11	15	0.01	0.7%
Child Resident	0.012	15	0.001	0.07%
Child of Farmer	0.005	15	0.0006	0.03%
Infant HMEI	0.4	8.5	0.09	4.6%
Infant Resident	0.04	8.5	0.008	0.4%
Infant of Farmer	0.02	8.5	0.003	0.2%
School Child 6 to 11	0.02	32.5	0.001	0.06%
School Child 11 to 16	0.02	52.5	0.0008	0.04%

[15] Of course, in less rural areas such as Blyth, there would be less agricultural activity.

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.

5.5 Particulates smaller than 2.5 microns

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

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

The HPA addresses the issue of the health effects of particulates in their September 2009 statement 'The Impact on Health of Emissions to Air from Municipal Incinerators'. It refers to the coefficients linking PM_{10} and $PM_{2.5}$ with effects on health derived by COMEAP and goes on to say that if these coefficients are applied to small increases in concentrations produced, locally, by incinerators; the estimated effects on health are likely to be small. The HPA notes that the coefficients that allow the use of number concentrations in impact calculations have not yet been defined because the national experts have not judged that the evidence is sufficient to do so. This is an area being kept under review by COMEAP.

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

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

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

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

5.3.4 Assessment of Health Effects from the Installation

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

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

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

The Applicant's assessment of the impact from Nitrogen dioxide long term, $PM_{10,}$ $PM_{2.5,}$, Hydrogen Fluoride long term, Cadmium, Mercury, Antimony, Arsenic, Lead, Chromium (II and III) Chromium (VI), Copper, Manganese, Nickel, Vanadium, Ammonia long term , Dioxins and Furans and VOC's long term, have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of Nitrogen dioxide short term, Carbon Monoxide short term, Sulphur dioxide, Hydrogen Chloride, Hydrogen Fluoride short term, Ammonia short term, VOC's short term 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. The Agency had some discussion with the applicant around the inclusion of dioxin-like PCB's, PAH's and abnormal emissions, however after further input from the applicant and our own check modelling we were able to agree the methodology employed by the applicant was satisfactory.

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

Public Health England and, Director of Public Health were consulted on the Application and Public Health England responded concluding that they had no significant concerns regarding the risk to the health of humans from the installation. The Food Standards Agency was also consulted during the permit determination and did not respond. Details of the responses provided by Public Health England and FSA to the consultation on this Application can be found in Annex 2.

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.

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

5.6.1 Sites Considered

The following Habitats (i.e. Special Protection Areas and Ramsar) sites are located within 10Km of the Installation:

Designated Sensitive Habitat Sites within 10Km

Name	Location (OS grid reference)		Approximate location relative to proposed stack location	
	Easting (metres)	Northing (metres)	Distance (km)	Direction
Northumbria Coast SPA/Ramsar	431226	582816	0.5	East
Note: Although the closest point has been identified for Northumbria Shore and the River Blyth Estuary in this table, the maximum concentration within the habitat site was used for the assessment.				

The following Sites of Special Scientific Interest are located within 2Km of the Installation:

Name	Location (OS grid reference)		Approximate location relative to proposed stack location	
	Easting (metres)	Northing (metres)	Distance (km)	Direction
The Northumberland Shore SSSI [1]	431226	582816	0.5	East
Note: Although the closest point has been identified for Northumbria Shore and the River Blyth Estuary in this table, the maximum concentration within the habitat site was used for the assessment.				

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

Name	Location (OS grid reference)		Approximate location relative to proposed stack location	
	Easting (metres)	Northing (metres)	Distance (km)	Direction
River Blyth Estuary Site of Importance for Nature Conservation (SINC) and Local Nature Reserve (LNR)[1]	430954	582501	0.4	South west
Note: Although the closest point has been identified for Northumbria Shore and the River Blyth Estuary in this table, the maximum concentration within the habitat site was used for the assessment.				

No other SNCIs, Local Wildlife Sites (LWSs) or Local Nature Reserves (LNRs) have been identified within 2 km of the site.

5.6.2 European Habitats Assessment

Northumberland Coast SPA/Ramsar

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

Table 1 – Long Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
Oxides of Nitrogen Annual mean	30	17	1.1	**3.7%**	18	59%
Sulphur dioxide Annual mean	20	2.8	0.28	**1.4%**	3.1	15%
Ammonia Annual mean	3	0.46	0.055	**1.8%**	0.52	17%
Particulates(PM_{10}) Annual mean	40	23.5	0.05	**0.13**	-	-
Particulates ($PM_{2.5}$) Annual mean	25	8.2	0.054	**0.22**	-	-

Note 1 All the above concentration figures are in µg/m^3

Note 2 No ecosystems have been identified where lower species, such as lichens & bryophytes, are an important part of the ecosystem's integrity

Note 3 Where – occurs in tables no further assessment is required as PC contribution is less than relevant percentage of relevant standard.

PCs can be considered **Insignificant** :

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

- where the **long- term** PC exceeds the limits defined above, we consider the PEC (PC + background). Where the PEC is shown to be <70% of the relevant EQS it can be screened out as insignificant and no further assessment is required

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.

Table 1A – Short Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
Oxides of Nitrogen	75	17	18	**23%**	35	47%
Hydrogen fluoride(daily mean)	5	3.5	0.088	**1.8%**	-	-
Hydrogen fluoride (weekly mean)	0.5	3.5	0.042	**8.4**	-	-
Particulates(PM_{10}) 24hr mean Annual mean	50	47	0.57	**0.01**	-	-

Note 1 All the above concentration figures are in µg/m^3

Note 2 Where – occurs in tables no further assessment is required as PC contribution is less than relevant percentage of relevant standard.

- If the **short-term** process contribution is less than **10%** of the relevant EQS; and
- where the **short-term** PC is **less than 20%** of the relevant short-term environmental standard minus twice the long-term background concentration.

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

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

The above short-term assessment Table 1A, shows HF and PM_{10} short term is below 10% of the EQS and therefore needs no further assessment. Short term NOx is above 10% of the EQS and therefore we need to consider if the PC is less than 20% of the relevant short-term environmental standard minus twice the long-term background concentration. Table 1A shows the operators assessment, where they have assessed the pollutants using the *incorrect long-term criteria*

- "where the **long- term** PC exceeds the limits defined above, we consider the PEC (PC + background). Where the PEC is shown to be <70% of the relevant EQS it can be screened out as insignificant and no further assessment is required"

As the above criteria is incorrect, we have applied the correct short-term criteria and it can be seen that the agencies check modelling shows where

$PC_{short\text{-}term}$ >20% ($standard_{short\text{-}term}$ $minus2xbackground_{long\text{-}term}$)

The following results are predicted.

Table 1 A (a)Short Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Concentration (Std – 2xbackground)	Predicted Concentration (Std – 2xbackground) as % EQS / EAL
Oxides of Nitrogen	75	17	18	**23%**	41	44%

Note that this assumes the short term ambient background concentration to be twice the long term ambient concentration.

Detailed assessment of short-term effects is often complex because the maximum process contribution and maximum background concentration may be separated both temporally and spatially so that the addition of the two "worst case" short-term concentrations together is unlikely. Estimates of short term predicted concentration (PC) may also have an error factor of 4 to 5.

As the above predictions were derived from a detailed modelling assessment not a screening tool, they can be compared directly with the standards. No exceedances of air quality standards are predicted with the maximum predicted PC's ranging to 44% of the relevant air quality standards. ($PC_{short\text{-}term}$ >20% ($standard_{short\text{-}term}$ minus2x$background_{long\text{-}term}$)

Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of NOx to be BAT for the Installation.

5.6.3 SSSI Assessment

Northumberland Shore

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

The Applicant's modelling was reviewed by the Environment Agency's technical specialists for modelling and air quality who agreed with the assessment's conclusions, that there would be no likely significant effect on the interest feature(s) of the protected site(s). Table 1 below provides an extract of the Applicants modelling results for long term process contribution and predicted environmental contributions from the installation.

Table 1 – Long Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
Oxides of Nitrogen Annual mean	30	17	1.1	**3.7%**	18	59%
Sulphur dioxide Annual mean	20	2.8	0.28	**1.4%**	3.1	15%
Ammonia Annual mean	3	0.46	0.055	**1.8%**	0.52	17%
Particulates(PM_{10}) Annual mean	40	23.5	0.05	**0.13**	-	-
Particulates ($PM_{2.5}$) Annual mean	25	8.2	0.054	**0.22**	-	-

Note 1 All the above concentration figures are in µg/m^3

Note 2 No ecosystems have been identified where lower species, such as lichens & bryophytes, are an important part of the ecosystem's integrity

Note 3 Where – occurs in tables no further assessment is required as PC contribution is less than relevant percentage of relevant standard.

PCs can be considered **Insignificant**:

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

- where the **long- term** PC exceeds the limits defined above, we consider the PEC (PC + background). Where the PEC is shown to be <70% of the relevant EQS it can be screened out as insignificant and no further assessment is required

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.

Table 1A – Short Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
Oxides of Nitrogen	75	17	18	**23%**	35	47%
Hydrogen fluoride(daily mean)	5	3.5	0.088	**1.8%**	-	-
Hydrogen fluoride (weekly mean)	0.5	3.5	0.042	**8.4**	-	-
Particulates(PM_{10}) 24hr mean Annual mean	50	47	0.57	**0.01**	-	-

Note 1 All the above concentration figures are in µg/m^3

Note 2 Where – occurs in tables no further assessment is required as PC contribution is less than relevant percentage of relevant standard.

- If the **short-term** process contribution is less than **10%** of the relevant EQS; and
- where the **short-term** PC is **less than 20%** of the relevant short-term environmental standard minus twice the long-term background concentration.

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

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

The above long-term assessment Table 1, shows that using the above criteria the predicted process contribution for emissions of long term NOx, SO_2, and Ammonia are above 1% of the EQS and therefore we need to consider the PEC, as the PEC for the above pollutants are all below 70% of the long term EQS no further assessment is required and are considered to be insignificant Particulates PM_{10} and $PM_{2.5}$ are less than 1% and therefore are also considered insignificant.

The above short-term assessment Table 1A, shows HF and PM_{10} short term is below 10% of the EQS and therefore needs no further assessment. Short term NOx is above 10% of the EQS and therefore we need to consider if the PC is less than 20% of the relevant short-term environmental standard minus twice the long-term background concentration. Table 1A shows the operators assessment, where they have assessed the pollutants using the *incorrect long-term criteria*

- "where the **long- term** PC exceeds the limits defined above, we consider the PEC (PC + background). Where the PEC is shown to be <70% of the relevant EQS it can be screened out as insignificant and no further assessment is required"

As the above criteria is incorrect, we have applied the correct short-term criteria and it can be seen that the agencies check modelling shows where

$PC_{short\text{-}term}$ >20% ($standard_{short\text{-}term}$ $minus2xbackground_{long\text{-}term}$)

The following results are predicted.

Table 1 A (a)Short Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Concentration (Std – 2xbackground)	Predicted Concentration (Std – 2xbackground) as % EQS / EAL
Oxides of Nitrogen	75	17	18	**23%**	41	44%

Note that this assumes the short term ambient background concentration to be twice the long term ambient concentration.

Detailed assessment of short-term effects is often complex because the maximum process contribution and maximum background concentration may be separated both temporally and spatially so that the addition of the two "worst case" short-term concentrations together is unlikely. Estimates of short term predicted concentration (PC) may also have an error factor of 4 to 5.

As the above predictions were derived from a detailed modelling assessment not a screening tool, they can be compared directly with the standards. No exceedances of air quality standards are predicted with the maximum predicted PC's ranging to 44% of the relevant air quality standards. ($PC_{short\text{-}term}$ >20% ($standard_{short\text{-}term}$ $minus2xbackground_{long\text{-}term}$)

Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of NOx to be BAT for the Installation.

5.4.4 Assessment of Non-Statutory Sites

River Blyth Estuary (SNCI & LNR)

Table 1 – Long Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
Oxides of Nitrogen Annual mean	30	17	1.1	**3.7%**	18	59%
Sulphur dioxide Annual mean	20	2.8	0.28	**1.4%**	3.1	15%
Ammonia Annual mean	3	0.46	0.055	**1.8%**	0.52	17%
Particulates(PM_{10}) Annual mean	40	23.5	0.05	**0.13**	-	-
Particulates ($PM_{2.5}$) Annual mean	25	8.2	0.054	**0.22**	-	-

Note 1 All the above concentration figures are in µg/m^3
Note 2 No ecosystems have been identified where lower species, such as lichens & bryophytes, are an important part of the ecosystem's integrity
Note 3 Where – occurs in tables no further assessment is required as PC contribution is less than relevant percentage of relevant standard.

PCs can be considered **Insignificant** :

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

- where the **long- term** PC exceeds the limits defined above, we consider the PEC (PC + background). Where the PEC is shown to be <70% of the relevant EQS it can be screened out as insignificant and no further assessment is required

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.

Table 1A – Short Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
Oxides of Nitrogen	75	17	18	**23%**	35	47%
Hydrogen fluoride(daily mean)	5	3.5	0.088	**1.8%**	-	-

Hydrogen fluoride (weekly mean)	0.5	3.5	0.042	**8.4**	-	-
Particulates(PM_{10}) 24hr mean Annual mean	50	47	0.57	**0.01**	-	-

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

Note 2 Where – occurs in tables no further assessment is required as PC contribution is less than relevant percentage of relevant standard.

- If the **short-term** process contribution is less than **10%** of the relevant EQS; and
- where the **short-term** PC is **less than 20%** of the relevant short-term environmental standard minus twice the long-term background concentration.

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

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

The above long-term assessment Table 1, shows that using the above criteria the predicted process contribution for emissions of long term NOx, SO_2, and Ammonia are above 1% of the EQS and therefore we need to consider the PEC, as the PEC for the above pollutants are all below 70% of the long term EQS no further assessment is required and are considered to be insignificant Particulates PM_{10} and $PM_{2.5}$ are less than 1% and therefore are also considered insignificant.

The above short-term assessment Table 1A shows HF and PM_{10} short term is below 10% of the EQS and therefore needs no further assessment. Short term NOx is above 10% of the EQS and therefore we need to consider if the PC is less than 20% of the relevant short-term environmental standard minus twice the long-term background concentration. Table 1A shows the operators assessment, where they have assessed the pollutants using the *incorrect long-term criteria*

- "where the **long- term** PC exceeds the limits defined above, we consider the PEC (PC + background). Where the PEC is shown to be <70% of the relevant EQS it can be screened out as insignificant and no further assessment is required"

As the above criteria is incorrect, we have applied the correct short-term criteria and it can be seen that the agencies check modelling shows where

$PC_{short\text{-}term}$ >20% ($standard_{short\text{-}term}$ minus2x$background_{long\text{-}term}$)

The following results are predicted.

Table 1 A (a)Short Term Highest modelled levels of pollutants at designated habitat sites

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Concentration (Std – 2xbackground)	Predicted Concentration (Std – 2xbackground) as % EQS / EAL
Oxides of Nitrogen	75	17	18	**23%**	41	44%

Note that this assumes the short term ambient background concentration to be twice the long term ambient concentration.

Detailed assessment of short-term effects is often complex because the maximum process contribution and maximum background concentration may be separated both temporally and spatially so that the addition of the two "worst case" short-term concentrations together is unlikely. Estimates of short term predicted concentration (PC) may also have an error factor of 4 to 5.

As the above predictions were derived from a detailed modelling assessment not a screening tool, they can be compared directly with the standards. No exceedances of air quality standards are predicted with the maximum predicted PC's ranging to 44% of the relevant air quality standards. ($PC_{short\text{-}term}$ >20% ($standard_{short\text{-}term}$ minus2xbackground$_{long\text{-}term}$)

Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of NOx to be BAT for the Installation.

Nitrogen and Acid Deposition

The rate of deposition of acidic compounds and nitrogen-containing species at the Northumbria Coast SPA/Ramsar site and the Northumberland Shore SSSI has been calculated. This allows the potential for adverse effects to be evaluated by comparison with critical loads for acid and nutrient nitrogen deposition. The assessment took account of emissions of oxides of nitrogen, sulphur dioxide, ammonia and hydrogen chloride from the main boiler stack.

Modelled Acid Deposition at designated sites (kEqH+ /ha/yr)

Site	Estimated acid deposition (kEqH+/ha-year)					
	Critical Load (CL)	Existing level	PC	PEC	PC/CL (%)	PEC/CL (%)
Northumbria Coast SPA/Ramsar site and the Northumberland Shore SSSI	2.0	1.03	0.073	1.10	3.6%	55%

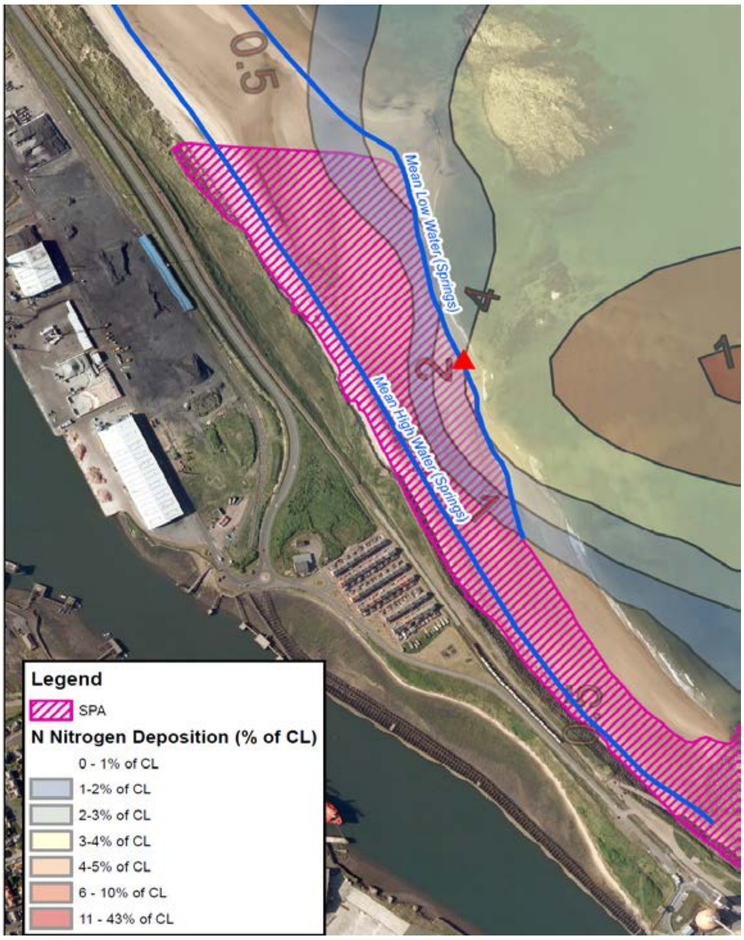
Modelled Nitrogen Deposition at designated sites (kg nitrogen/ha/yr)

Site	Estimated nutrient N deposition (kgN/ha-year)					
	Critical Load (CL)	Existing level	PC	PEC	PC/CL (%)	PEC/CL (%)
Northumbria Coast SPA/Ramsar site and the Northumberland Shore SSSI	10	10.5	0.40	10.9	4.0%	109%

The Northumbria Coast Ramsar and Special Protection Area (SPA) is the closest internationally designated site to the proposal and located approximately 150m east of the proposed development site. The Ramsar/SPA is designated for its bird populations. Northumberland Shore Site of Special Scientific Interest (SSSI), designated for its wintering populations of shore birds is the closest nationally designated site to the proposal. The SSSI partly overlaps with the Northumbria Coast Ramsar/SPA but also includes mudflats in the River Blyth Estuary, the nearest of which are approximately 100m west of the proposed development site, as well as intertidal sand areas on the coast, approximately 100m to the east. The River Blyth Estuary also has a local, non-statutory designation as a Site of Nature Conservation Importance (SNCI) for its ornithological interest and estuarine habitats.

The highest concentrations of Nitrogen deposition occurs (see red triangle on graphic below) close to the Mean Low Water Mark. The background levels at this site are already exceeded. The area of the SPA/Ramsar where the percentage of the Critical Load is above 1% is located between high and low water marks. The tidal cycle at Blyth is diurnal so this area will be inundated by sea water twice every 24hr period. The soluble nature of the deposited nitrogen species and large volume of seawater means it would be taken into solution and rapidly diluted to levels unlikely to impact on the designated area.

Nitrogen Deposition (% of CL) showing maximum point of impact in relation to Northumbria shore SPA/Ramsar.



▲ Maximum impact point for Nitrogen deposition

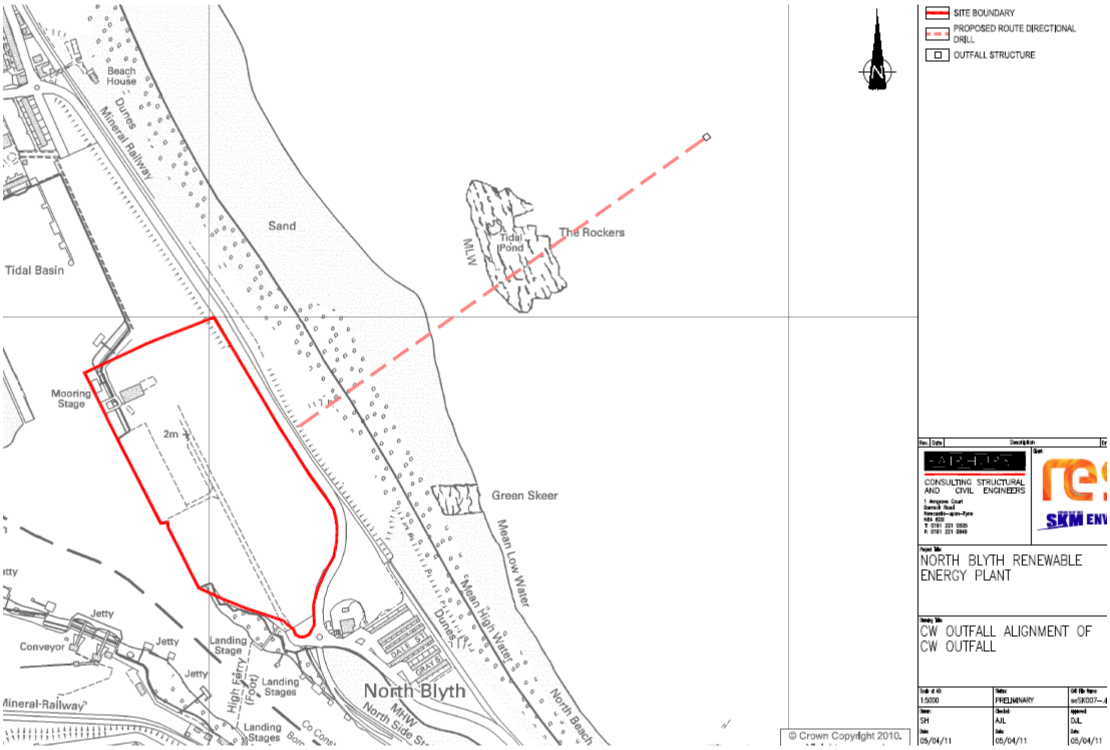
Emissions to water (North Sea)

The volume of water to be extracted for process cooling at 3.77 m^3/s and will be sourced from the River Blyth Estuary and discharged approximately 10 ^{0}C warmer into the North Sea.

Fish will be protected from entering the intake through the use of an intake system protected by a wedge-wire screen, or equivalent system, with 3 mm spacing, and minimising the approach velocity of water to the wedge-wire screen to a maximum of 0.13 m^3/s. This type of screen is purged clean using compressed air, thereby avoiding impacts to marine life. The above should ensure no likely significant effect at the point of extraction in the River Blyth.

The discharge into the North Sea will occur at a minimum depth of approximately 8m. Thermal effects will be minimised by efficiently mixing the discharge with the receiving water using a diffuser. EA guidance regarding the design of the intake and outfall will be followed.

Outfall pipeline from installation to actual outfall via diffuser.



Assessment of effluent discharge.

Process effluents will be discharged to the North Sea via an outfall that will release:

- cooling water (cira 3.77m^3/s)
- boiler blowdown (typically 2m^3/hr with peak at 12.5m^3/hr, this is water removed from the boiler to remove suspended solids build up and/or reduce the water level
- neutralised water from the water treatment plant (up to 3m^3/hr); and
- other minor discharges

Cooling water

This discharge will be 3.77 m^3/s, and be at a temperature 10 ºC above ambient. It will also be chlorinated, and will have an expected concentration of 0.2 mg/l Total Residual Oxidant (expressed as free chlorine). The water will be abstracted from the Blyth Estuary, and will be discharged through an outfall to the North Sea, which will extend nearly one kilometre offshore and have a 4 port diffuser. The cooling water system is a once-through direct cooling system.

Boiler Blowdown

This waste stream comes from the boiler water. It is expected to have an average flow of 2 m^3/hour (0.0006 m^3/s) with a peak flow of 12.5 m^3/hour (0.0035 m^3/s). It is stated that the waste stream contains phosphate at 5 mg/l and ammonia at 1 mg/l. As the actual plant has not been bought yet it is not clear what other contaminants the waste stream will contain, although it is expected that it will contain other chemicals which are used as corrosion inhibitors and conditioners. (IC7 addresses this issue)

Water Treatment Plant Effluent

This waste stream will come from the plant treating mains water. It is expected to have a flow of 3 m^3/hour (0.0008 m^3/s). The only contaminant it is quoted to contain is salts (sulphates and chlorides), but at a salinity less than seawater.

Other minor discharges
These include effluent produced by 'drain-down' of the steam water circuit. This 'drain-down' effluent will undoubtedly contain various contaminants, including phosphate and ammonia. It is stated that it will be discharged gradually into the cooling water. It is not clear at this point whether the steam water circuit will undergo wet lay-up during maintenance periods. Assuming that it will, there will also be effluent arising from the 'drain-down' of this water, after the maintenance period is complete.

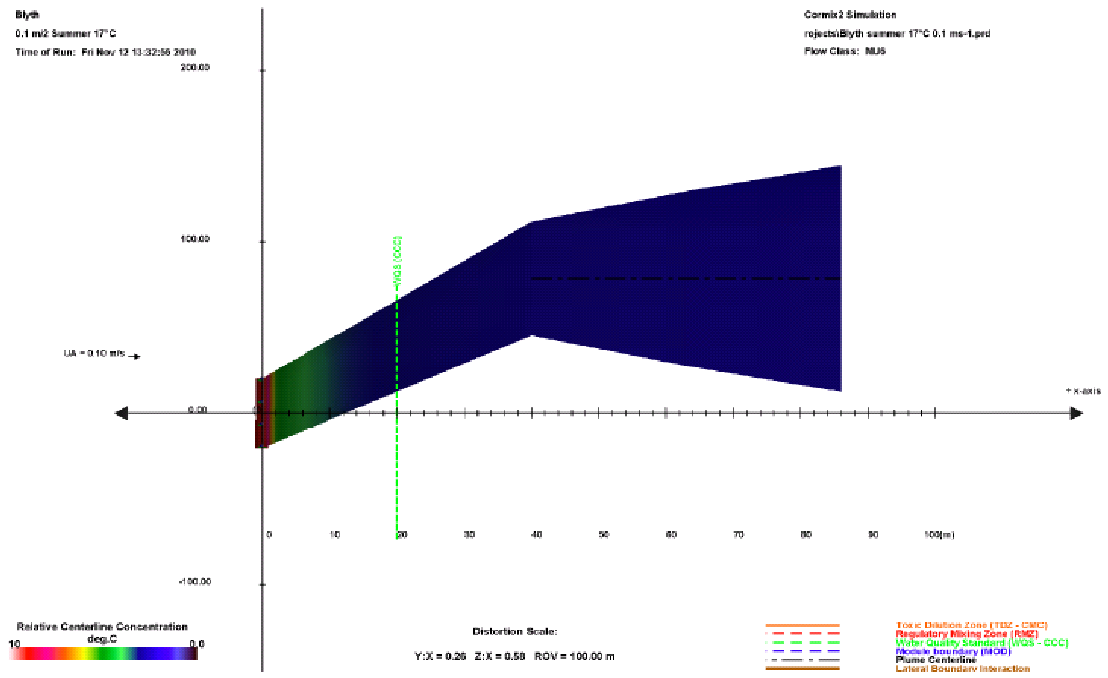
To address the above we have included an improvement condition IC7 which asks the Operator to submit a written report to the Environment Agency detailing the chemicals to be used in the operation of the plant including cooling water, boiler blowdown, water treatment and other minor discharges including maintenance periods. Once identified, show how the discharge to sea, will not breech the limits specified in the permit.

Initial mixing of waste streams
Based on the available information, the 3 small volume waste streams defined above will all be mixed with the cooling water, prior to discharge through the sea outfall. They will therefore all receive considerable dilution prior to discharge to the receiving coastal waters.

The applicant has concluded that no significant impact is predicted from these chemicals. This conclusion may be reasonable given the scale of use and dilution within the cooling waters, but this will need to be considered once the chemicals are defined. Biocide concentrations in the cooling water and boiler blowdown will be monitored prior to discharge to ensure that the residual chlorine level at discharge does not exceed 0.2 mg/l.

A computer model (on behalf of the operator) of the near field thermal discharge plume was created, this showed that the temperature distribution is buoyancy-dominated, with warm water discharged via the outfall mixing with the receiving water and rising to the surface. The cooling water was assumed to be 10^{o}C above ambient. Calculations were taken at maximum summer and minimum winter temperatures. The thermal plume reduces rapidly in temperature due to mixing with the receiving water.

<u>Simulation plan view of the thermal discharge into the North Sea during the summer under low tidal stream.</u>



N.B. The green line (WQS (CCC)) marks the distance downstream at which the plume temperature is reduced to only 1 °C above the ambient water temperature.

With regards to the concentration of free Chlorine in the discharge. Mixing will reduce the levels however it is the reaction of free Chlorine with sea water that has a much larger effect.

Predicted total free chlorine remaining above 10µg/l limit after various dilutions

Dilution factor	Total free chlorine discharged in 1 second Winter seawater temp. 4 °C (ICD = 291 µg/l)	Total free chlorine discharged in 1 second Summer seawater temp. 16 °C (ICD = 737 µg/l)
1 (no dilution)	716,300	716,300
1.1	606,593	438,451
1.2	496,886	160,602
1.3	387,179	-117,247
1.4	277,472	-395,096
1.5	167,765	-672,945
1.6	58,058	-950,794
1.7	-51,649	-1,228,643
1.8	-161,356	-1,506,492
1.9	-271,063	-1,784,341
2	-380,770	-2,062,190

The above table shows the total amount of free chlorine discharged in 1 second that needs to be removed to meet the EQS of 10µg/l. The calculations are for the effect of ICD (Instantaneous Chlorine Demand) alone, without the dilution effect, the instantaneous chlorine demand of the sea water is so high that the level of free chlorine will be un-measurable by the time the plume is diluted by a factor of 2.

The impacts of chlorination compounds on the benthos are predicted to be insignificant because the heated plume will be buoyant and, therefore, will have limited contact with the seabed over the time when the chlorine is reacting with the receiving water. The Environment Agency set up a model and found that the extent of the mixing zone for Total Residual Oxidant for the cooling water discharge from North Blyth biomass plant is not considered significant in terms of environmental impact however the extent of the proposed outfall is larger than predicted in the Operators modelling. However despite this, the Agency agrees there is unlikely to be a significant impact.

It is also anticipated that, given the relatively small size of the discharge (c3.77m3/s) the rapid mixing of the discharge water into the receiving sea water, and the instantaneous chlorine demand of marine waters, it is predicted that at a discharge concentration of 200µg/l free chlorine, the concentration of chlorine at a distance of 15m from the discharge point will be below the EQS of 10µg/l.

5.5 <u>Impact of abnormal operations</u>

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

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

Article 45(1)(f) requires that the permit shall specify the maximum permissible period of any technically unavoidable stoppages, disturbances, or failures of the purification devices or the measurement devices, during which the concentrations in the discharges into the air may exceed the prescribed emission limit values. In this case we have decided to set the time limit at 4 hours, which is the maximum period prescribed by Article 46(6).

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

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

- Dioxin emissions of 5 ng/m^3 (50 x normal)
- Mercury emissions are 100 times those of normal operation
- NO_x emissions of 500 mg/m^3 (2.5 x normal)
- Particulate emissions of 150 mg/m^3 (5 x normal)
- Metal emissions other than mercury *(for which there is a short term EAL)* are 5 times those of normal operation
- SO_2 emissions of 333$mg/m^{3]}$ (6.5 x normal)
- HCl emissions of 67mg/m^3 (3.5x normal)

All of the above are based on 97% of the half-hourly average values over the year and do not exceed any of the emission limit values.

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.

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

Pollutant	**EQS / EAL**		**Back-ground**	**Process Contribution (PC)**		**Predicted Environmental Concentration (PEC)**	
	µg/m^3		**µg/m^3**	**µg/m^3**	**% of EAL**	**µg/m^3**	**% of EAL**
NO_2	200	2	59.2	34.5	17.3	93.7	46.9
PM_{10}	50	3	23.5	0.95	1.90	24.45	48.9
SO_2	266	4	20.7	75.5	28.4	96.2	36.2
	350	5	20.7	64.4	18.40	85.1	24.3
HCl	750	6	0.66	18.4	2.4533333	19.1	2.54
HF	160	6	4	14.3	8.9375	18.30	11.4
Hg	7.5	1	0.00041	0.6873	9.16	0.68771	9.169
Sb	150	1	0.0027	0.7637	0.51	0.76640	0.511
Cu	200	1	0.012	0.7637	0.38	0.77570	0.388
Mn	1500	1	0.018	0.7637	0.05	0.78170	0.0521
Cr (II)(III)	150	1	0.0038	0.7637	0.51	0.76750	0.5117
Dioxins			1E-08	9.00E-09		1.90E-08	

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 PM_{10}, HCL, HF, Hg, Sb, Cu, Mn, Cr(ll)(lll) and Dioxins substances can still be considered insignificant, in that the PC is still <10% of the short-term EQS/EAL.

Also from the table above emissions of NO_2 and SO_2 (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.

We have not assessed the impact of abnormal operations against long term EQSs for the reasons set out above. The operator modelled and predicted 5 ng/m^3 but even doubling that to 10 ng/m^3 for the maximum period of abnormal operation, would result in an increase of approximately 70% in the TDI reported in section 5.3.3. In these circumstances the TDI would be 0.11 pg(I-TEQ/ kg-BW/day), which is 10% of the COT TDI. At this level, emissions of dioxins will still not pose a risk to human health.

5.6 Other Emissions

Noise

The operator submitted a noise assessment which was found on the whole to be reasonable however it did not include all areas of the installations activities where noise may occur because of changes in the installation boundary during determination, such as unloading of biomass into reception hoppers during ship deliveries in daytime and night-time.

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Hence we have used pre operational conditions PO8 and PO9 asking the operator to re-submit their Noise Impact Assessment using new data following the BS 4142 assessment methodology including the above missing information, the condition shall also include the operator taking any necessary actions following the outcome of the report. Based upon the information in the application, and taking into account the requirements of P08 & P09 we are satisfied that the appropriate measures will be in place to prevent pollution from noise emissions.

Odour

The fuel will not be significantly odorous and should not attract scavengers and pests or release bioaerosols. The six fuel stores will be managed to handle the fuel on a first in, first out basis as much as practicable. Operations at the Installation will be continuous once it has been commissioned and the capacity of the Installation’s fuel handling system means that there will be a continuous turnover of the wood at the site and the potential for degradation will be minimal. The Installation will employ suitable management systems to ensure that once operational, fuel is not stored for prolonged periods of time. The number of fuel storage buildings and the rate of consumption of the fuel by the Installation will facilitate this. The recommended time wood fuels can be stored depends on the moisture content of the fuels. Wood chip with a moisture content below 30% are considered stable and suitable for a storage period of up to two months. In the case of high moisture content wood fuel, the maximum recommended duration is just a few weeks. However, with 7 ship deliveries anticipated per month, turnover of the fuel is anticipated to occur within a period of less than a week. Prior to planned outages the fuel in the stores will be run low to prevent prolonged storage periods.

Following acceptance, Procedures for the safe management and storage of the fuel including the non-recyclable waste wood will be created as part of the development of a formal EMS to cover operations in the Installation. All operatives will be trained in the proper segregation of the individual biomass streams and in the observance of the specific storage requirements (location, capacity, cleaning) for the fuel. While non-recyclable waste woods will remain segregated from the virgin biomass prior to blending, there would be no hazards associated with the mixing of these fuels. The ends of the fuel storage buildings facing the Power Island will have rapid open and shut doors to allow ease of access for mobile shovels and vehicle deliveries and minimising any odour escape from the building.

Based upon the information in the application, we are satisfied that the appropriate measures will be in place to prevent pollution from odour emissions.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

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

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

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

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

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

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

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

6.1.1 Consideration of Furnace Type

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

<u>Summary comparison of thermal treatment technologies</u> (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: 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	– 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	~ 5 t/h (short drum) – 10 t/h	no oxidation of metals no combustion energy for metals/inert	limited wastes process control and	dependent on process temperature	High pre-treatment, operation and

	residues/plastics pyrolysis is less widely used/proven than incineration	(medium drum)	in reactor acid neutralisation possible syngas available	engineering critical high skill req. not widely proven need market for syngas	- residue produced requires further processing e.g. combustion	capital costs

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

- Moving Grate Furnace
- Fluidised Bed, bubbling and circulating
- Pyrolysis / Gasification

The applicant assessed the above candidate furnaces, showing that for a reasonably homogenous fuel, chipped virgin biomass and waste wood, both bubbling fluidised bed (BFB) and circulating fluidised bed (CFB) would both meet BAT, the operator compared both these technologies, and also looked at sites already using these technologies and found large CFB plants with commercially proven units up to 240MWe.

Advantages of CFB over BFB for proposed Installation:
the thermal inertia provided by the bed mass ensures complete combustion of a wider range of fuel moisture contents, providing stable combustion conditions;

- lower capital cost (assuming the requirement for 2 x BFB units);
- improved fuel efficiency and increased cycle efficiency possible due to higher potential steam conditions
- larger unit capacity (with respect to thermal output) result in a smaller boiler footprint overall, which is advantageous in a constrained site such as that proposed for the North Blyth Renewable Energy Project.

CFB can achieve efficient combustion at lower temperatures, of between 750^{o}c – 950^{o}c (850^{o}c to meet IED) this is considerably lower than for grate and pulverised systems, this in turn leads to lower $NO_{x.}$ The long residence time of particles within the fluidised bed boiler ensures the burnout of the fuel is very high resulting in relatively high efficiency combustion. The BREF agrees that this technology meets BAT.

The Applicant has proposed to use a furnace technology comprising *circulating fluidised bed technology* of which is identified 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 not having a local mains supply of gas to the site, and gas-oil being low sulphur. Use of the gas-oil will be minimised, normally only used during start up and shut down. Gas-oil will not be utilised during normal plant operation as the combustion of the virgin biomass and non-recyclable waste wood will be sufficient to maintain the required temperature and also because of the high cost of this fuel. In addition, it is a requirement of the Renewable Obligations Order 2009 [Refiv] that no more than 10% of the fuel (with respect to energy content) is from fossil fuel, in any particular month, for the Installation to be eligible for Renewable Obligation Certificates. It is not envisaged that gas-oil use will approach this figure and as stated in Requirement 44 of the draft DCO, the Installation will adhere to the Renewable Energy Directive sustainable biomass fuel sourcing criteria for the lifetime of its operation whether it is receiving financial support or not.

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
- availability and cost of water and other reagents
- energy supply possibilities (e.g. supply of heat from condensing scrubbers)
- reduction of emissions by primary methods
- release of noise.

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

6.2.1 Particulate Matter

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

- Starved air systems – this technique also simultaneously reduces CO and is defined as BAT for pyrolysis and gasification systems.
- Optimise primary and secondary air injection – this technique is BAT for all plant.
- Flue gas recirculation – this technique reduces the consumption of reagents for secondary NO_x control and can increase overall energy recovery, although in some applications there can be corrosion problems – the technique is considered BAT for all plant.

The applicant has argued that Low NOx burners are not considered to be appropriate for application in the support burner function for the proposed CFB unit. Low NOx fuel oil burners dilute the high temperature zone to inhibit NOx formation, the resultant flame produced is extended and less controlled which would, given the geometry of a CFB furnace, lead to impingement on boiler tube surfaces, thus accelerating metal wear and increasing failure rates and down time. The proposed support burners are low thermal input burners and the support burner function will only be used very intermittently under unstable operating conditions which are expected to amount to only several hundred hours a year. While low NOx burners may be appropriate on non CFB oil firing units, it is not considered BAT here for the reasons above and given the additional provision of the SNCR NOx abatement system which will be used to maintain NOx emission within the required emission limit value.

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 ammonia as the reagent.

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

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

6.2.3 Acid Gases, SO_x, HCl and HF

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

Acid gases and halogens : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Wet	High reaction rates Low solid residues production Reagent delivery may be optimised by concentration and flow rate	Large effluent disposal and water consumption if not fully treated for re-cycle Effluent treatment plant required May result in wet plume Energy required for effluent treatment and		Plants with high acid gas and metal components in exhaust gas – HWIs

		plume reheat		
Dry	Low water use Reagent consumption may be reduced by recycling in plant Lower energy use Higher reliability	Higher solid residue production Reagent consumption controlled only by input rate		All plant
Semi-dry	Medium reaction rates Reagent delivery may be varied by concentration and input rate	Higher solid waste residues		All plant
Reagent Type: Sodium Hydroxide	Highest removal rates Low solid waste production	Corrosive material ETP sludge for disposal		HWIs
Reagent 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	Efficient temperature range may be at upper end for use with bag filters	Not proven at large plant	CWIs

	systems proven	– Leachable solid residues Bicarbonate more expensive		

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 gasoil as the support fuel on the basis that the installation site not having a local mains supply of gas to the site, and gas-oil being low sulphur. Use of the gas-oil will be minimised, normally only used during start up and shut down. Gas-oil will not be utilised during normal plant operation as the combustion of the virgin biomass and non-recyclable waste wood will be sufficient to maintain the required temperature and also because of the high cost of this fuel. In addition, it is a requirement of the Renewable Obligations Order 2009 [Refiv] that no more than 10% of the fuel (with respect to energy content) is from fossil fuel, in any particular month, for the Installation to be eligible for Renewable Obligation Certificates. It is not envisaged that gas-oil use will approach this figure and as stated in Requirement 44 of the draft DCO, the Installation will adhere to the Renewable Energy Directive sustainable biomass fuel sourcing criteria for the lifetime of its operation whether it is receiving financial support or not, and we agree with that assessment.

- Management of heterogeneous wastes – this will disperse problem wastes such as PVC by ensuring a homogeneous waste feed.

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

If the temperatures in the SNCR zone are too high then a lot of the ammonia released will be combusted, leading to excessive reagent use to control NOx emissions. If the temperatures are too low the ammonia does not react and passes through the plant as ammonia slip. Therefore an intelligent control system, will be employed which measures the stack NOx and ammonia concentration and furnace parameters and will use them to control the rate of reagent dosing at each level in the furnace. Ammonia slip will be limited to less than 10 mg/Nm3*.*

In this case, the Applicant proposes to use *SNCR*. 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*			Covered in boiler design	All plant

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

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

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

In this case the Applicant proposes separate feed and we are satisfied their proposals 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	Can be combined with acid gas absorber or fed	Combined feed rate usually controlled by acid gas		All plant. Separate feed normally BAT

recovery	separately.	content.		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.

In this case the Applicant proposes separate feed and we are satisfied their proposals are BAT.

6.3 BAT and global warming potential

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

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

The major source of greenhouse gas emissions from the installation is however CO_2 from the combustion of waste. There will also be CO_2 emissions from the burning of support fuels at start up, shut down and should it be necessary to maintain combustion temperatures. BAT for greenhouse gas emissions is to maximise energy recovery and efficiency.

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

Parameter	GWP tonnes CO_2 equivalent per annum	
	Released	Saving/offset
Direct CO_2 emissions (auxiliary fuel)	402.75	
CO_2 emissions (imported electricity)	32	
Direct CO_2 emissions from the process	0	
N_2O emissions from the process	27,702	
Total Released	**28,136**	
Energy Recovered (Electricity)		133,649
Energy Recovered (heat)		0
Total Offset		**13,3649**
Net GWP	**-105,512**	

Taking this into account, the net emissions of CO_2 from the installation are estimated at -105,513 tonnes per annum. (28,136-133,649). The Installation is not subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2003; therefore it is a requirement of IED to investigate how emissions of greenhouse gases emitted from the installation might be prevented or minimised.

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

On the debit side

- CO_2 emissions from the burning of the wood (however wood is considered to be a renewable fuel and with a GWP of zero in accordance with our guidance H1 annex H);
- 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;

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. This is constant for all options considered in the BAT assessment.

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

	Technology option	Predicted GWP (energy + emission contributions) GWP tonnes CO_2 equivalent per annum	Best option	Applicant's preferred option
NOx Abatement	SNCR (ammonia)	3477		3477
	SNCR (urea)	7260		
	SCR	21.1	21.1	
Acid Gas Abatement	Dry (lime)	55.9		55.9
	Dry (bicarbonate)	55.9		
	Dry/semi dry	50.3	50.3	
	Totals			
	GWP		71.4	3533

It can be seen from the above table that SNCR has a greater GWP than SCR, however this increase is significantly less than the overall GWP that is illustrated by the GWP tonnes CO_2 equivilant per annum -105,512.

- The SCR system is significantly more expensive than a SNCR system owing to the high cost of the specialist catalyst and catalyst vessels.

- the temperature at which SCR is effective typically occurs part way through the boiler. Should the catalyst be located at this point then it would be exposed to a significant dust burden which would blind and contaminate the catalyst. Alternatively, the SCR could be located downstream of the flue gas cleaning (i.e. the fabric filters) with a high stack flue gas temperatures, which is also inefficient. The cost of the catalyst and its maintenance/replacement can be high;

- SCR is less suitable for biomass as the deactivation of the catalyst is faster when firing biomass compared to for example coal. Indeed the UKTWG to the LCP BREF review states that "SCR abatement is not BAT because of poisoning of the catalyst by many biomass ashes and it also reduces efficiency";

- there are also issues with the disposal of the contaminated catalyst owing to its high heavy metal content and other contaminants;

The purpose of a BAT appraisal is to determine which option minimises the impact on the environment as a whole. In this context the benefit in terms of GWP of the other options is considered to be more than offset by the other benefits of the preferred option.

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

6.4 BAT and POPs

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

However, it needs to be borne in mind that this application is for a particular type of installation, namely a waste 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 Equivalent) limit of 0.1ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. EPR requires that, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be specified for monitoring and reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. EPR requires monitoring of a range of PAHs and dioxin-like PCBs in waste incineration Permits at the same frequency as dioxins are monitored. We have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like PCBs and the range of PAHs identified by Defra in the Environmental Permitting Guidance on the IED. We are confident that the measures taken to control the release of dioxins will also control the releases of dioxin-like PCBs and PAHs. Section 5.2 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

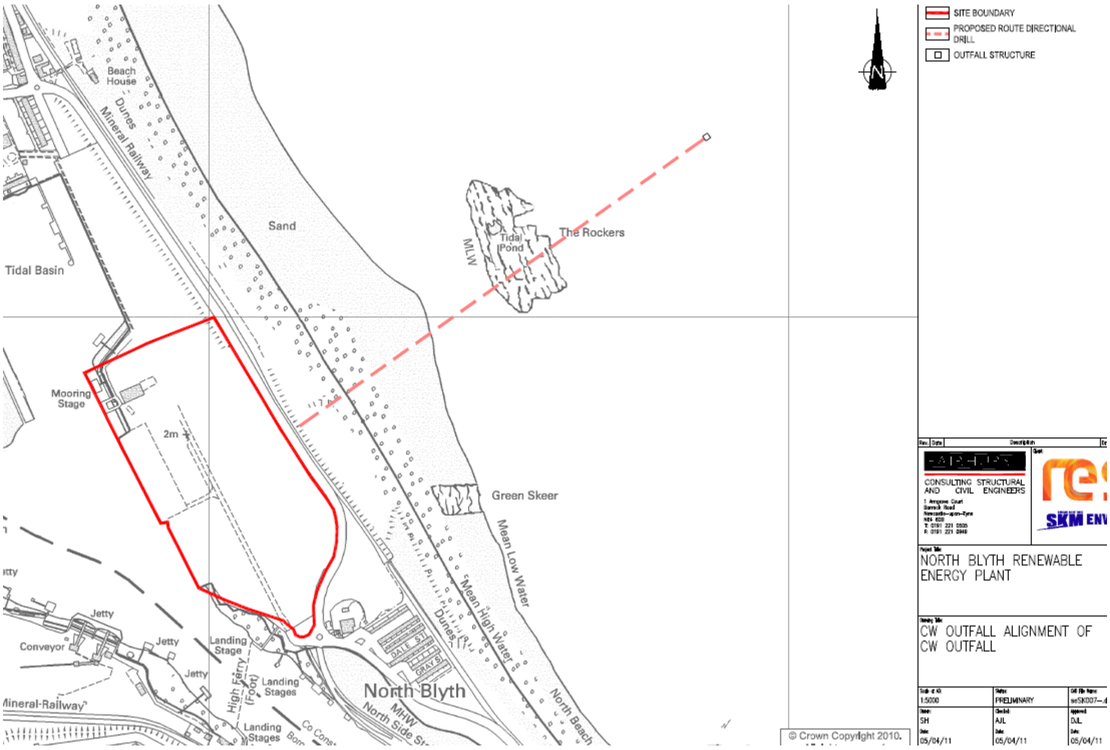
Emissions to water (North Sea)

The volume of water to be extracted for process cooling at 3.77 m^3/s and will be sourced from the River Blyth Estuary and discharged approximately 10 ^{0}C warmer into the North Sea.

Fish will be protected from entering the intake through the use of an intake system protected by a wedge-wire screen, or equivalent system, with 3 mm spacing, and minimising the approach velocity of water to the wedge-wire screen to a maximum of 0.13 m^3/s. This type of screen is purged clean using compressed air, thereby avoiding impacts to marine life. The above should ensure no likely significant effect at the point of extraction in the river Blyth.

The discharge into the North Sea will occur at a minimum depth of approximately 8m. Thermal effects will be minimised by efficiently mixing the discharge with the receiving water using a diffuser. EA guidance regarding the design of the intake and outfall will be followed.

Outfall pipeline from installation to actual outfall via diffuser.



<u>Assessment of effluent discharge.</u>

Process effluents will be discharged to the North Sea via an outfall that will release:

- cooling water (cira 3.77m^3/s)
- boiler blowdown (typically 2m^3/hr with peak at 12.5m^3/hr, this is water removed from the boiler to remove suspended solids build up and/or reduce the water level
- neutralised water from the water treatment plant (up to 3m^3/hr); and
- other minor discharges

Cooling water

This discharge will be 3.77 m^3/s, and be at a temperature 10 ºC above ambient. It will also be chlorinated, and will have an expected concentration of 0.2 mg/l Total Residual Oxidant (expressed as free chlorine). The water will be abstracted from the Blyth Estuary, and will be discharged through an outfall to the North Sea, which will extend nearly one kilometre offshore and have a 4 port diffuser. The cooling water system is a once-through direct cooling system.

Boiler Blowdown

This waste stream comes from the boiler water. It is expected to have an average flow of 2 m^3/hour (0.0006 m^3/s) with a peak flow of 12.5 m^3/hour (0.0035 m^3/s). It is stated that the waste stream contains phosphate at 5 mg/l and ammonia at 1 mg/l. As the actual plant has not been bought yet It is not clear what other contaminants the waste stream will contain, although it is expected that it will contain other chemicals which are used as corrosion inhibitors and conditioners. (IC7 addresses this issue)

Water Treatment Plant Effluent
This waste stream will come from the plant treating mains water. It is expected to have a flow of 3 m^3/hour (0.0008 m^3/s). The only contaminant it is quoted to contain is salts (sulphates and chlorides), but at a salinity less than seawater.

Other minor discharges
These include effluent produced by 'drain-down' of the steam water circuit. This 'drain-down' effluent will undoubtedly contain various contaminants, including phosphate and ammonia. It is stated that it will be discharged gradually into the cooling water. It is not clear at this point whether the steam water circuit will undergo wet lay-up during maintenance periods. Assuming that it will, there will also be effluent arising from the 'drain-down' of this water, after the maintenance period is complete.

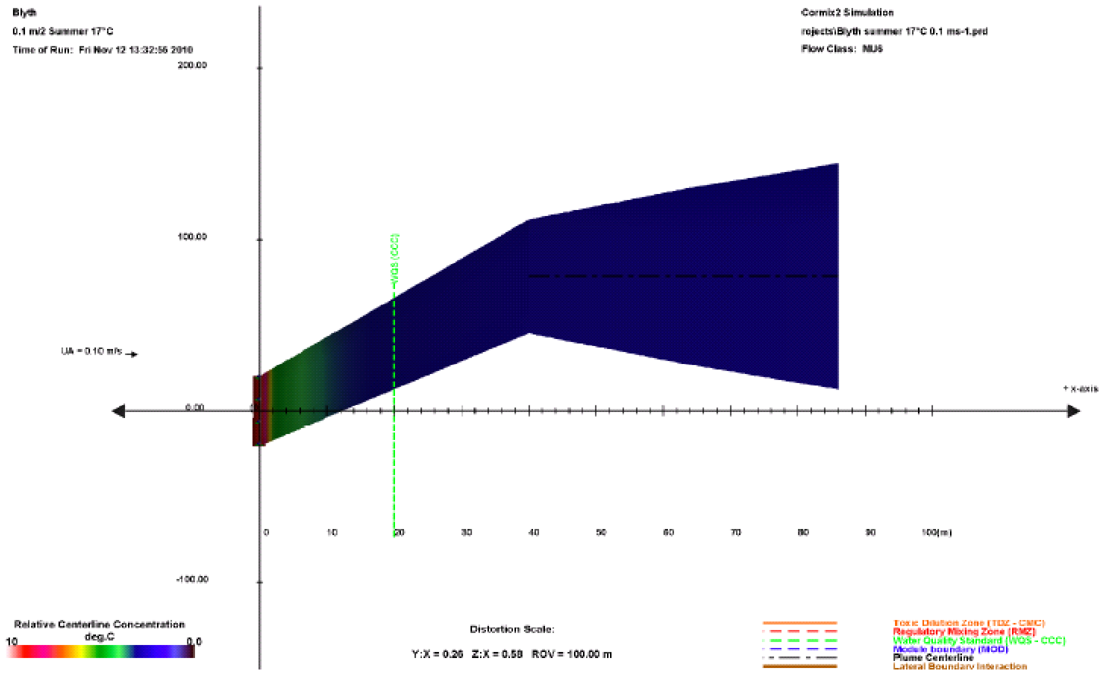
To address the above we have included an improvement condition IC7 which asks the Operator to submit a written report to the Environment Agency detailing the chemicals to be used in the operation of the plant including cooling water, boiler blowdown, water treatment and other minor discharges including maintenance periods. Once identified, show how the discharge to sea, will not breech the limits specified in the permit.

Initial mixing of waste streams
Based on the available information, the 3 small volume waste streams defined above will all be mixed with the cooling water, prior to discharge through the sea outfall. They will therefore all receive considerable dilution prior to discharge to the receiving coastal waters.

The applicant has concluded that no significant impact is predicted from these chemicals. This conclusion may be reasonable given the scale of use and dilution within the cooling waters, but this will need to be considered once the chemicals are defined. Biocide concentrations in the cooling water and boiler blowdown will be monitored prior to discharge to ensure that the residual chlorine level at discharge does not exceed 0.2 mg/l.

A computer model (on behalf of the operator) of the near field thermal discharge plume was created, this showed that the temperature distribution is buoyancy-dominated, with warm water discharged via the outfall mixing with the receiving water and rising to the surface. The cooling water was assumed to be 10^{o}C above ambient. Calculations were taken at maximum summer and minimum winter temperatures. The thermal plume reduces rapidly in temperature due to mixing with the receiving water.

<u>Simulation plan view of the thermal discharge into the North Sea during the summer under low tidal stream.</u>



N.B. The green line (WQS (CCC)) marks the distance downstream at which the plume temperature is reduced to only 1 °C above the ambient water temperature.

With regards to the concentration of free Chlorine in the discharge. Mixing will reduce the levels however it is the reaction of free Chlorine with sea water that has a much larger effect.

<u>Predicted total free chlorine remaining above 10µg/l limit after various dilutions</u>

Dilution factor	Total free chlorine discharged in 1 second Winter seawater temp. 4 °C (ICD = 291 µg/l)	Total free chlorine discharged in 1 second Summer seawater temp. 16 °C (ICD = 737 µg/l)
1 (no dilution)	716,300	716,300
1.1	606,593	438,451
1.2	496,886	160,602
1.3	387,179	-117,247
1.4	277,472	-395,096
1.5	167,765	-672,945
1.6	58,058	-950,794
1.7	-51,649	-1,228,643
1.8	-161,356	-1,506,492
1.9	-271,063	-1,784,341
2	-380,770	-2,062,190

The above table shows the total amount of free chlorine discharged in 1 second that needs to be removed to meet the EQS of 10µg/l. The calculations are for the effect of ICD (Instantaneous Chlorine Demand) alone, without the dilution effect, the instantaneous chlorine demand of the sea water is so high that the level of free chlorine will be un-measurable by the time the plume is diluted by a factor of 2.

The impacts of chlorination compounds on the benthos are predicted to be insignificant because the heated plume will be buoyant and, therefore, will have limited contact with the seabed over the time when the chlorine is reacting with the receiving water. The Environment Agency set up a model and found that the extent of the mixing zone for Total Residual Oxidant for the cooling water discharge from North Blyth biomass plant is not considered significant in terms of environmental impact however the extent of the proposed outfall is larger than predicted in the Operators modelling. However despite this, the Agency agrees there is unlikely to be a significant impact.

It is also anticipated that, given the relatively small size of the discharge (c3.77m3/s) the rapid mixing of the discharge water into the receiving sea water, and the instantaneous chlorine demand of marine waters, it is predicted that at a discharge concentration of 200µg/l free chlorine, the concentration of chlorine at a distance of 15m from the discharge point will be below the EQS of 10µg/l.

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

6.5.2 Emissions to sewer
No emissions to sewer

6.5.3 Fugitive emissions

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

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

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

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

6.5.4 Odour

See section 5.6

6.5.5 Noise and vibration

See section 5.6

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

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

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

The use of IED Chapter IV emission limits for air dispersion modelling sets the worst case scenario. If this shows emissions are insignificant then we have accepted that the Applicant's proposals are BAT, and that there is no justification to reduce ELV's below the Chapter IV limits in these circumstances. At the time of submission the Operator was advised to submit the application as a 1.1 Combustion activity, during the duly making stage it was determined that the application was a 5.1 co-incineration activity hence all assessments used the incorrect oxygen levels, to correct this ELV's set have been adjusted by 50% to account for this.

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

(i) Local factors

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

(ii) National and European EQSs

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

(iii) Global Warming

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

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

(iv) Commissioning

Before the plant can become fully operational it will be necessary for it to be commissioned. Before commissioning can commence the Operator is required by pre-operational condition PO4 to submit a commissioning plan to the Agency for approval. Commissioning can only begin and be carried out in accordance with the approved proposals in the plan.

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

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

Abatement plant optimisation details (IC5).

6.7 Monitoring

6.7.1 Monitoring during normal operations

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

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

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

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

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

The Operator has stated that they are currently unsure as to whether they will be providing back-up CEMS. If provided these will be switched into full operation immediately in the event that there is any failure in the regular monitoring equipment. The back-up CEMS measure the same parameters as the operating CEMS. In the unlikely event that the back-up CEMS also fail Condition 2.3.10 of the permit requires that the abnormal operating conditions apply. The Operator is fully aware that not having back up CEMS means that CEMS failure could result in a shut down rather than abnormal operations scenario.

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

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

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

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

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

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

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

6.8 Reporting

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

7 Other legal requirements

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

7.1 The EPR 2010 and related Directives

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

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

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

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

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

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

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

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

We have complied with our obligation under Article 9(2) so far as we are able in that no conclusion has yet been arrived at. From consideration of the Environmental Statement and our response as consultee to the planning process we are satisfied that no additional or different permit conditions are necessary.

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

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

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

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

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

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

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

Article 23(1) requires the permit to specify:

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

These are all covered by permit conditions.

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

We consider that the intended method of waste treatment is acceptable from the point of view of environmental protection so Article 23(3) does not apply. Energy efficiency is dealt with elsewhere in this document but we consider the conditions of the permit ensure that the recovery of energy take place with a high level of energy efficiency in accordance with Article 23(4).

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

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

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

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

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

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

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

Our decision in this case has been reached following a programme of public consultation, on the original application. The way in which this has been done is set out in Section 2.2. A summary of the responses received to our consultations and our consideration of them is set out in Annex 2.

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.

We assessed the Application and concluded that the Installation will not damage the special features of any SSSI. This was recorded on a CROW Appendix 4 form.

The CROW assessment is summarised in greater detail in section 5.6.3 of this document. A copy of the full Appendix 4 Assessment can be found on the public register.

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

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

7.2.6 **Marine and Coastal Access Act 2009**

The agency consulted externally with The Port of Blyth, IFCA and Blyth Harbour Commission, also internally with Fisheries and Biodiversity. Responses were forthcoming from IFCA and F & B. both of these consultees stated that they had been involved in the project for some time and felt they had nothing to add to previous comments given during planning and the DCO.

7.3 National secondary legislation

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

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

We consulted Natural England by means of an Appendix 11 Who after discussion with colleagues agreed that the Appendix 11 should be submitted for information only.

The habitat assessment is summarised in greater detail in section 5.6.2 of this document. A copy of the full Appendix 11 Assessment can be found on the public register.

7.3.2 **Water Framework Directive Regulations 2003**

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

7.3.3 **The Persistent Organic Pollutants Regulations 2007**

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

7.4 Other relevant legal requirements

7.4.1 Duty to Involve

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

The way in which the Environment Agency has consulted with the public and other interested parties is set out in section 2.2 of this document. The way in which we have taken account of the representations we have received is set out in Annex 2. 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 (a) 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 (a) and Table S2.2 in Schedule 2 of the Permit
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Condition 3.1.1 and 3.1.2 and Tables S3.1, S3.1(a) and S3.2 in Schedule 3 of the permit
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	Condition 3.1.1 and 3.1.2 and Tables S3.1, S3.1(a) and S3.2 in Schedule 3 of the permit
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 to 3.5.5 and Tables S3.1, S3.1(a), S3.2, S3.3 and S3.4. in Schedule 3 of the permit, 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 2.3.10 to 2.3.11
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to	Emissions and their ground-level impacts are discussed in the body of this

IED Article	Requirement	Delivered by
	safeguard human health and the environment.	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 Tables S3.1 and S3.1a
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.	Condition 2.3.1(a) and Table S1.2 of Schedule 1 of the permit.
46(6)	Limits the maximum period of operation when an ELV is exceeded to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year. Limits on dust (150 mg/m3), CO and TOC not to be exceeded during this period.	Condition 2.3.10.and 2.3.11 Condition 2.3.6 and Table S3.1(a)
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m3), CO and TOC not to be exceeded during this period.	Condition 2.3.10
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.5.1 to 3.5.5. Reference conditions are defined in Schedule 6.
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 3.5.2, and 3.5.3
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Tables S3.1, S3.1(a), S3.2 and S3.3
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values	Conditions 4.1.1 and 4.1.2.

IED Article	Requirement	Delivered by
	which are included in the 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 3.3.5 (b) to (e)
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	(a) - Condition 3.5.1 and Table S3.1 (a)
50(2)	Flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber.	(b) – Condition 2.3.6 (a) and Pre-operational condition PO6.
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	(c) Condition 2.3.7
50(4)(a)	Automatic shut off to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.6 (a)
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.6 (a)
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 (b), (c) and (d)
50(5)	Any heat generated from the process shall be recovered as far as practicable.	Conditions 1.2.1 to 1.2.3 and Pre-operational condition PO2
50(6)	Relates to the feeding of infectious clinical waste into the furnace.	No infectious clinical waste will be burnt
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit
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 met.	No such conditions have been allowed
51(3)	Changes in operating conditions shall include emission limit values for CO and TOC set out in Part 3 of Annex VI.	No such conditions have been allowed

IED Article	Requirement	Delivered by
52(1)	Take all necessary precautions concerning delivery and reception of wastes, to prevent or minimise pollution.	Conditions 2.3.1, 2.3.3, 3.2, 3.3 and 3.4 and 3.6
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Condition 2.3.3 (a) and Table S2.2 in Schedule 3 of the permit.
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1 and 1.4.2
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 1.4.1, 2.3.1 and 3.2.1
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.5.1, Table 3.4 and pre operational condition PO3.
55(1)	Application, decision and permit to be publicly available.	All documents are accessible from the environment agency Public Register.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2 and 4.2.3.

ANNEX 2: Pre-Operational Conditions

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

Reference	Pre-operational measures
PO1	Prior to the commencement of commissioning, the Operator shall send a summary of the site Environment Management System (EMS) to the Environment Agency and make available for inspection all documents and procedures which form part of the EMS. The EMS shall be developed in line with the requirements set out in Section 1 of How to comply with your environmental permit – Getting the basics right. The documents and procedures set out in the EMS shall form the written management system referenced in condition 1.1.1 (a) of the permit.
PO2	Prior to the commencement of commissioning, the Operator shall send a report to the Environment Agency which will contain a comprehensive review of the options available for utilising the heat generated by the waste incineration process in order to ensure that it is recovered as far as practicable. The review shall detail any identified proposals for improving the recovery and utilisation of waste heat and shall provide a timetable for their implementation.
PO3	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency for approval a protocol for the sampling and testing of bottom ash for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.
PO4	Prior to the commencement of commissioning; the Operator shall provide a written commissioning plan, including timelines for completion, for approval by the Environment Agency. The commissioning plan shall include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved.
PO5	Prior to the commencement of commissioning, the Operator shall submit a written report to the Agency detailing the waste acceptance procedure to be used at the site. The waste acceptance procedure shall include the process and systems by which wastes unsuitable for incineration at the site will be controlled. The procedure shall be implemented in accordance with the written approval from the Agency.
PO6	After completion of furnace design and at least three calendar months before any furnace operation; the operator shall submit a written report to the Agency of the details of the computational fluid dynamic (CFD) modelling or equivalent procedure to be agreed with the Agency. The report shall demonstrate whether the design combustion conditions comply with the residence time and temperature requirements as defined by the Waste Incineration Directive.
PO7	Within twelve months of permit issue the operator shall re-submit their noise impact assessment to the Environment Agency for approval using new survey data, following the BS 4142 assessment methodology. The assessment shall also include: • unloading of biomass into reception hoppers during ship deliveries during daytime and night-time, weekdays and weekends, and • the addition of +5dB acoustic correction for distinguishable notes, distinct impulses or noise which are irregular enough to attract attention. The applicant

	must provide full justification if the BS 4142 +5dB acoustic correction is not applied.
PO8	Within 3 months of completing PO7 the operator shall submit a report to the Agency for agreement. The report shall contain a review of the noise impact assessment in relation to the requirements of condition 3.4.1 and include a timetable for the implementation of any identified measures to meet the requirements of condition 3.4.1.

ANNEX 3: Improvement Conditions

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

Reference	Improvement measure	Completion date
IC1	The Operator shall submit a written report to the Environment Agency on the implementation of its Environmental Management System and the progress made in the certification of the system by an external body or if appropriate submit a schedule by which the EMS will be certified.	Within 12 months of the date on which virgin biomass/wood waste is first burnt.
IC2	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1, identifying the fractions within the PM_{10}, and $PM_{2.5}$ ranges. The proposal shall include a timetable for approval by the Environment Agency to carry out such tests and produce a report on the results. On receipt of written agreement by the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning.
IC3	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions.	Within 4 months of the completion of commissioning.
IC4	The Operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the 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.

Reference	Improvement measure	Completion date
IC5	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.
IC6	The Operator shall submit a written summary report to the Environment Agency to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1 (a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	Initial calibration report to be submitted to the Agency within 3 months of completion of commissioning. Full summary evidence compliance report to be submitted within 18 months of commissioning.
IC7	The Operator shall submit a written report to the Environment Agency detailing the chemicals to be used in the operation of the plant including cooling water, boiler blowdown, water treatment and other minor discharges including maintenance periods. Once identified, show how the discharge to sea, will meet condition 3.1.2 of the permit	Within 6 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 11/09/13 to 09/10/13 Copies of the Application were placed in the Environment Public Register at Tyneside House, Skinnerburn Road, Newcastle Business Park, Newcastle NE24 7AR and the Local authority, Northumberland County Council Public Register at Loansdean, Morpeth, NE61 2AP

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

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- External consultation bodies
- Local Authority – Northumberland County Council
- Sewage Undertaker – Northumbrian Water Ltd
- Harbour Authority – Blyth Harbour Commission
- Port Authority – Port of Blyth
- Fisheries – Northumberland Sea Fisheries Committee
- Foods Standards Agency
- Health and Safety Executive
- Public Health England
- Director of Public Health
- Local Fire Service
- National Grid
- Natural England

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from **Public Health England**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Cumulative effects of the installation and fire prevention measures.	Impacts of emissions are discussed in section 5 of this document, we consider that emissions from the site will not cause significant pollution or harm to human health. As discussed in section 4.3.4 of this document 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.

Response Received from **Northumberland Inshore fisheries and conservation authority**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
They stated that they had commented on the building of this facility in 2010 and this application brought no further concerns, and therefore nothing to add.	no action necessary

Response Received from **Northumberland Fire and Rescue service**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No concerns	No action necessary