Determination of an Application for an Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2016

Decision document recording our decision-making process

The Permit Number is:	EPR/ZP3309LW
The Applicant / Operator is:	FCC Waste Services (UK) Limited
The Installation is located at:	Grangetown Prairie Grangetown Redcar TS6 6TY

What this document is about

This is a decision document, which accompanies a permit.

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

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

Preliminary information and use of terms

We gave the application the reference number EPR/ZP3309LW/A001. We refer to the application as "the **Application**" in this document to be consistent.

The number we have given to the permit is EPR/ZP3309LW. We refer to the permit as "the **Permit**" in this document.

The Application was duly made on 23/12/2022.

The Applicant is FCC Waste Services (UK) Limited. We refer to FCC Waste Services (UK) 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 FCC Waste Services (UK) Limited “the **Operator**”.

FCC Waste Services (UK) Limited’s proposed facility is located at Grangetown Prairie, Grangetown, Redcar TS6 6TY We refer to this as “the **Installation**” in this document.

How this document is structured

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.)

AAD	Ambient Air Directive (2008/50/EC)
APC	Air Pollution Control
AQS	Air Quality Strategy
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	Best Available Techniques (BAT) Reference Documents for Waste Incineration
BAT C	BAT conclusions
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
CW	Clinical waste
CWI	Clinical waste incinerator
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 2016 (SI 2016 No. 1154) as amended
ES	Environmental standard
EWC	European waste catalogue
FGC	Flue gas cleaning
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HPA	Health Protection Agency (now UKHSA, United Kingdom Health Security Agency)

HRA	Human Rights Act 1998
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCPD	Large Combustion Plant Directive (2001/80/EC) – now superseded by IED
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LADPH	Local Authority Director(s) of Public Health
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
OTNOC	Other than normal operating conditions
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
PHE	United Kingdom Health Security Agency
POP(s)	Persistent organic pollutant(s)
PPS	Public participation statement
PR	Public register
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RDF	Refuse derived fuel
RGS	Regulatory Guidance Series
SAC	Special Area of Conservation
SED	Solvent Emissions Directive (1999/13/EC) – now superseded by IED

SCR	Selective catalytic reduction
SGN	Sector guidance note
SHPI(s)	Site(s) of High Public Interest
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)
SS	Sewage sludge
SSSI(s)	Site(s) of Special Scientific Interest
SWMA	Specified waste management activity
TDI	Tolerable daily intake
TEF	Toxic Equivalent Factors
TGN	Technical guidance note
TOC	Total Organic Carbon
UHV	Upper heating value –also termed gross calorific value
UN_ECE	United Nations Environmental Commission for Europe
US EPA	United States Environmental Protection Agency
WFD	Waste Framework Directive (2008/98/EC)
WHO	World Health Organisation
WID	Waste Incineration Directive (2000/76/EC) – now superseded by IED

1 Our decision

We 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 23/12.22. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

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

2.2 Consultation on the Application

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

the involvement of representatives of interested persons in the exercise of our functions, by providing them with information, consulting them or involving them in any other way. In this case, our consultation already satisfies the Act's requirements.

We advertised the Application by a notice placed on our website, which contained all the information required by the IED. We also placed an advertisement in the Teesside Gazette letting people know the Application was on our website.

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

- Food Standards Agency
- Hartlepool Borough Council
- United Kingdom Health Security Agency
- Director of Public Health
- Cleveland Fire and Rescue Service
- Health and Safety Executive

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

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

2.3 Requests for Further Information

We received additional information during the determination from the Applicant. The additional information was placed on our public register.

- Revised drainage plan, showing a connection to foul sewer and removal of package treatment plant
- Revised Noise Impact assessment, including additional monitoring
- A Noise Management Plan
- Revised Site plan showing the medium combustion plant release point
- Revised Human Health Risk Assessment, considering future development in the area
- Revised habitats assessment
- A cost benefit assessment of SCR vs SNCR abatement techniques

Having carefully considered the Application and all other relevant information, we put our draft decision before the public and other interested parties in the form of a draft Permit, together with an explanatory document. The consultation on our draft decision was between 16/07/24 and 13/08/24.

The issues raised in the consultation were the same as those raised previously and already reported in Annex 4 and so have not been repeated in this decision document.

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

3 The legal framework

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

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

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

We consider that, if we grant 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 of 3 tonnes or more 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 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 below), such as air pollution control plant, , and the ash storage bunker, are therefore included in the listed activity description.

An Installation may also comprise "directly associated activities", which at this Installation includes the generation of electricity using a steam turbine, a back up electricity generator for emergencies, waste shredding and waste storage. These activities comprise one Installation, because the incineration plant and the steam turbine are successive steps in an integrated activity.

4.1.2 The Site

The Installation is located on Grangetown Prairie, Grangetown, approximately 4.5 km to the west of Middlesbrough town centre in Teesside. The Facility will be located at an approximate National Grid Reference of NZ 54452 21363, with the nearest postcode listed as TS6 6TY.

Grangetown Prairie is located adjacent to the A66 and within the western footprint of the former Cleveland Steel Works, now part of the South Tees Development Corporation

The Installation is surrounded by largely industrial or former industrial land. The nearest residential properties are approximately 0.4 km to the south.

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 of the Permit. The Operator is required to carry out the permitted activities within the site boundary.

Further information on the site is addressed below in 4.3.

4.1.3 What the Installation does

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

Notwithstanding the fact that energy will be recovered from the process; the process is nevertheless 'incineration' because it is considered that its main purpose is the thermal treatment of waste.

Waste will be delivered by road within covered vehicles. The waste will be tipped by vehicles into the fuel bunker in the Waste Reception Building.

The air from the fuel bunker is continually extracted and used as combustion air. This produces a slight negative pressure in the bunker to ensure dust and odour control.

A grab crane will be used to transfer waste to a feed hopper that will feed the moving grate furnace where the waste will be burned.

The furnace will be designed to ensure that the combustion gases are maintained, to at least 850 ^{o}C for a minimum of two seconds.

Emissions to air will be via a 90 m high stack and will be minimised by cleaning the waste combustion gases as follows:

- Oxides of nitrogen (NOx) will be abated using Selective Non-Catalytic Reduction (SNCR)
- Acid gases will be abated using a lime abatement system
- Dioxins, mercury and volatiles abated using activated carbon injection
- Particulate matter and metals abated by bag filters

Hot gases from the incineration of waste will be used to generate steam in a boiler. The design of the boilers will ensure that the flue gas temperature is quickly reduced to minimise the risk of dioxin reformation.

The steam generated in the boilers will be fed to a steam turbine which will generate electricity.

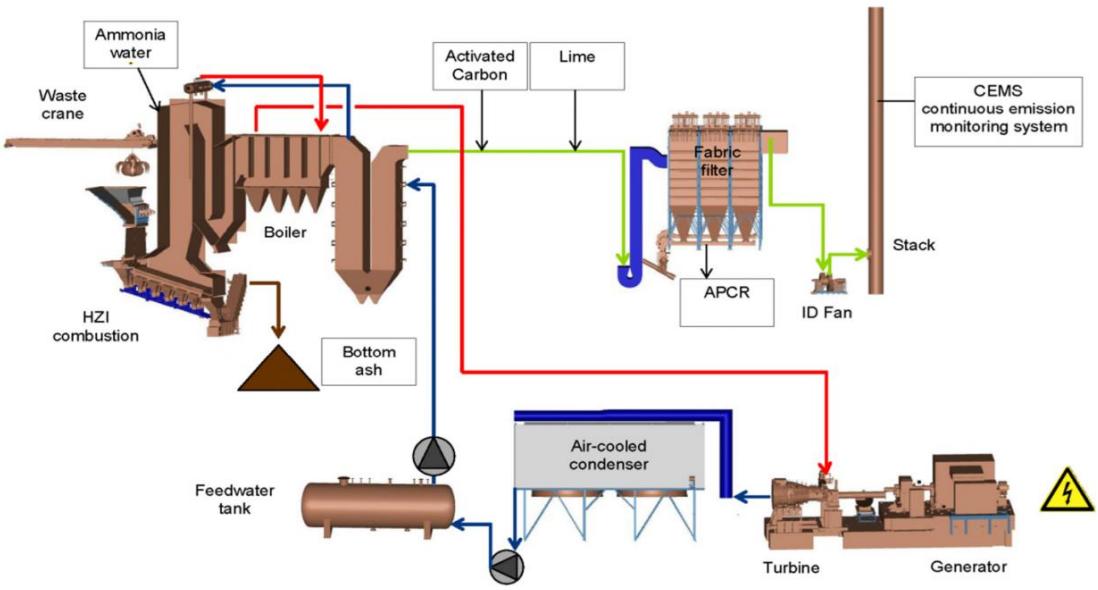
Steam will be condensed in an air-cooled condenser and recycled to the boiler. Process wastewater will be re-used for quenching bottom ash. After quenching in water, bottom ash will be kept in an indoor storage area, before unloading onto vehicles in an enclosed building. Air pollution control (APC) residues will be stored in silos prior to removal from site in sealed tankers.

All process water will be re-used.

Surface water will be collected and pass through oil separators prior to entering the site drainage system. Roof water will enter the site drainage system directly. The site drainage system will discharge surface and roof water into Holme Brook.

The Installation will generate electricity at a maximum rate of 49.9 MWe.

The Operator will have an Environmental Management System (EMS) and intends to have it certified to ISO 14001.



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

Waste throughput, Tonnes	450,000 t/annum (operating 8000 hours per year with an 88% grate capacity)	28.125 t/hour nominal load, each line
Waste processed	MSW	
Number of lines	2	
Furnace technology	Grate	
Auxiliary Fuel	Gas Oil	
Acid gas abatement	Dry	Hydrated lime
NOx abatement	SNCR	Ammonia
Reagent consumption	Auxiliary Fuel: 234 t/annum Ammonia: 1008 t/annum Hydrated lime: 6200 t/annum Activated carbon: 112 t/annum Towns water 30,000 t/annum	
Flue gas recirculation	No	
Dioxin abatement	Activated carbon	
Stacks	Line A 454379 521412 & Line B 454381 521408	
	Height: 90 m	Diameter: 1.9 m
Flue gas within each stack	Flow: 42.19 Nm^3/s	Velocity: 18.44 m/s
	Temperature 135°C	
Electricity generated	49.42 MWe	
Electricity exported	44.7 MWe	
Steam conditions	Temperature, 430°C	Pressure, 72 bar

4.1.4 Key Issues in the Determination

The key issues arising during this determination were *assessment of the impact of air emissions and the assessment of BAT,* 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 A66 lies next to the Installation with South Bank station located approximately 900 m to the west. The town of Eston is located approximately 2.5 km to the south of the Installation and the village of Lazenby is located approximately 3 km to the southeast. Middlesbrough town centre lies approximately 4.5 km east of the Environmental Permit Boundary.

The Installation is situated within the western footprint of the former Cleveland Steel Works, now part of the South Tees Development Corporation (STDC). The STDC was established to further the economic development of the Tees Valley through the creation of the Teesworks Development, a 4,500 ac site of industrial and underutilised land around the banks of the River Tees.

Access to the proposed Installation will form part of wider highway improvements undertaken by the STDC who own the site.

The Applicant described previous use of the site:

1857	Eston Iron Works is in the northeast of the site and the Eston Branch Railway runs along the western boundary of the site.
1895	The site forms part of the Cleveland Steel Works. There are several large buildings associated with the works in the north of the site with railway sidings and tanks across the rest of the site.
1899	No change seen.
1919 – 1931	No change seen.
1938	No change seen.
1953 – 1955	Expansion of Steelworks building over the south and east of the site including pipelines running from the western boundary.
1975	The site infrastructure has reduced in size and there are fewer railway sidings along the western side of the site.

1990 – 1994	The site infrastructure has further reduced in size with the northeast area of the site appearing demolished.
2000	Site demolished; few ancillary buildings remain.
2006	Site demolished; no buildings remain. Track which previously ran through the centre of the site now also removed.
2020	No changes seen.

The Installation is not within a Groundwater Source Protection Zone (SPZ).

Remediation works have been undertaken at the site to ensure that, prior to the development of the Energy Recovery Facility (ERF), the site is in a suitable condition to be developed upon. The remediation works carried out were to address the presence of asbestos fibres and non-aqueous phase liquids in soils on the site. These were excavated during earthworks to prepare a development platform for the site's redevelopment.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The Applicant described measures to prevent pollution to ground and groundwater from potentially polluting substances. They are summarised below:

- The reinforced concrete waste bunker will be designed to follow BS EN 1992-3
- The whole of the Installation's operational areas will be hard-surfaced
- All liquids used at the Installation will be provided with suitable secondary containment measures; all bunds will be served by blind collection points
- Suitable spill kits will be provided at strategic points to deal with minor spillages

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

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

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

4.2.3 Closure and decommissioning

Having considered the information given in the Application, we are satisfied that appropriate measures will be in place for the closure and decommissioning of the Installation, as referred to in the Application. Pre-operational condition PO1 requires the Operator to have an EMS in place before the Installation is operational, and this will include a site closure plan.

At the definitive cessation of activities, the Operator must satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or groundwater, considering both the baseline conditions and the site's current or approved future use. To do this, the Operator will apply to us for surrender of the permit, which we will not grant 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 the Applicant is the person who will have control over the operation of the Installation after the granting of the Permit; and the Applicant will be able to operate the Installation so as to comply with the conditions included in the Permit.

4.3.2 Management

The Applicant has said 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 EMS and must be in place prior to commissioning as required by a pre-operational condition (PO1).

The Applicant submitted a Fire Prevention Plan (FPP). Because the design of the site has not been finalised the FPP, requires updating. An FPP must be in place prior to commissioning as required by pre-operational condition (PO2)

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
The Application	ECL Ref: ECL.007.04.01/EPTR dated April 2022 Section 4 Operating techniques Section 5 Emissions (excluding 5.7) *Section 6 Raw materials*
Other information	Revised drainage plan DC-XX-XX-GA-C-301-P06 dated June 2021 Noise management plan ECL Ref: FCCE.04.01/NMP dated October 2023

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.

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.

The incineration plant will take municipal waste, which has not been source-segregated or separately collected or otherwise recovered, recycled or composted. Waste codes for separately collected fractions of waste are not included in the list of permitted wastes, except that separately collected fractions which prove to be unsuitable for recovery may be included.

We have limited the capacity of the Installation to 450,000 tonnes per annum. This is based on the Installation operating 8,000 hours per year at a nominal capacity of 28.125 tonnes per hour. The Applicants risk assessments were based on this throughput.

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

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

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

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

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

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

4. The extent to which the Installation meets the requirement of Article 14(5) of the Energy Efficiency Directive which requires new thermal electricity generation Installations with a total thermal input exceeding 20 MW to carry out a cost-benefit assessment to "*assess the cost and benefits of providing for the operation of the Installation as a high-efficiency cogeneration Installation*".

   Cogeneration means the simultaneous generation in one process of thermal energy and electrical or mechanical energy and is also known as combined heat and power (CHP)

   High-efficiency co-generation is cogeneration which achieves at least 10% savings in primary energy usage compared to the separate generation of heat and power – see Annex II of the Energy Efficiency Directive for detail on how to calculate this.

(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 several measures that will be implemented at the Installation to increase its energy efficiency:

- The boilers will be equipped with economisers and super-heaters to optimise thermal cycle efficiency without prejudicing boiler tube life, having regard for the nature of the waste that is being processed

- Unnecessary releases of steam and hot water will be avoided, to avoid the loss of boiler water treatment chemicals and the heat contained within the steam and water

- Low grade heat will be extracted from the turbine and used to preheat combustion air to improve the efficiency of the thermal cycle

- Steady operation will be maintained where necessary using auxiliary fuel firing

- Boiler heat exchange surfaces will be cleaned on a regular basis to ensure ongoing efficient heat recovery; and a secondary economiser will recover heat downstream of the main boiler to cool down the flue gas to the correct temperature for lime injection

- High efficiency motors will be used

- High efficiency lighting will be used

- Inverter controls will be used wherever possible

- Plant and pipework will be insulated to a high standard; thermal loss calculations will, be undertaken in order to properly specify the specific insulation requirement

- Pressure drops in ductwork will be minimised, where practicable, to reduce fan power consumption

- Variable speed motors will be fitted to the building ventilation system to accurately control air movement within the plant, thereby minimising electricity consumption.

The specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 85.39 kWh/t. The Installation capacity is 450,000 t/pa.

The BREF says that electricity consumption is typically between 60 kWh/t and 190 kWh/t depending on the LCV of the waste.

The specific energy consumption is in line with that set out above.

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

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

Our CHP Ready Guidance - February 2013 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 0.4 – 0.8 MWh of electricity can be generated per tonne of waste.

Our technical guidance note, SGN EPR S5.01, states that where electricity only is generated, 5-9 MW of electricity should be recoverable per 100,000 tonnes/annum of waste (which equates to 0.4 – 0.72 MWh/tonne of waste

The Installation will generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. The Sankey diagram in section 9.6.2 of the Application shows 44.64 MW of electricity produced for an annual burn of 450,000 tonnes, which represents 9.92 MW per 100,000 tonnes/yr of waste burned (0.79 MWh/tonne of waste The Installation is therefore above the indicative BAT range.

The Applicant provided a calculation of the gross electrical efficiency. The gross electrical efficiency will be 32.95% which is towards the top of the BAT AEEL range of 25 - 35%.

In accordance with BAT 2 table S3.3 of the Permit requires the gross electrical efficiency to be measured by carrying out a performance test at full load.

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 and provided a CHP-R assessment as part of their application, which showed there was potential to provide district heating to local businesses; suitable opportunities are being 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 CHP-R 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.

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

(iv) R1 Calculation

The R1 calculation and / or gaining accreditation under the DEFRA Good Quality CHP Scheme 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 presented a calculation of the R1 factor (as defined under the WFD 2008). The R1 formula is a measure of the extent to which energy is recovered from incineration plant. The formula is:

$$R1 = (Ep – (Ef + Ei)) / (0.97 \times (Ew + Ef))$$

Where:

- Ep means annual energy produced as heat or electricity. It is calculated in the form of electricity being multiplied by 2.6 and heat for commercial use being multiplied by 1.1 (GJ/yr).
- Ef means annual energy input to the system from fuels contributing to the production of steam (GJ/yr).
- Ew means annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/yr).
- Ei means annual energy imported excluding Ew and Ef (GJ/yr)
- 0.97 is a factor accounting for energy losses due to bottom ash and radiation.

Where municipal waste incinerators can achieve an R1 factor of 0.65 or above, the plant will be considered to be a ‘recovery activity’ for the purposes of the Waste Framework Directive. Again whether or not an Installation achieves an R1 score of >0.65 is not a matter directly relevant to this determination. However by being classified as a ‘recovery activity’ rather than as a ‘disposal activity’, the Operator could draw financial and other benefits.

The R1 Factor Calculation and supporting evidence provided indicates the Installation during normal operation should achieve an R1 energy efficiency of 0.822 and meet the minimum requirement to be classified as an R1 Recovery Operation under the waste hierarchy.

The R1 factor can only be determined from operational data over a full year. At application stage it is only possible to make a provisional assessment. Ep measures the energy recovered for use from the incinerator. This energy will have been recovered not just from the combustion of waste (Ew), but also from the combustion of the support fuel at start up and shut down and where required to maintain the 850 ºC combustion temperature (Ef). Ei is additional energy imported, which will primarily be electricity from the grid. These parameters will depend on the way in which the plant is operated, e.g. number of start ups and shut downs.

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

(v) Choice of Steam Turbine

The total steam quantity generated by the heat recovery boiler is used in a common condensing turbine to generate electricity. The steam turbine will be used in condensing mode. It has been designed to accept the total steam flow produced by the combustion water steam process.

The Application showed that the steam conditions will be 430^{o}C and 72 bar. We are satisfied that this represents BAT in terms of steam conditions to ensure efficient energy recovery.

We are satisfied that this represents BAT in terms of steam conditions to ensure efficient energy recovery.

(vi) Choice of Cooling System

The Applicant has chosen an air-cooled condenser unit with six fans. This is designed to condense the total amount of exhaust steam, including that from the turbine and allows for maximum flexibility against variations in thermal load and/or ambient variation.

(vii) Compliance with Article 14(5) of the Energy Efficiency Directive

The Applicant has submitted a cost-benefit assessment of opportunities for high efficiency co-generation within 15 km of the installation in which they calculated net present value. If the NPV is positive (i.e. any number more than zero) it means that the investors will make a rate of return that makes the scheme commercially viable. A negative NPV means that the project will not be commercially viable. The Applicant's assessment showed a net present value of £416,412 which demonstrates that operating as a high-efficiency cogeneration Installation will be financially viable. We have therefore included conditions in the Operator's permit as described in section [viii] below.

(viii) 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. 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 3.1.3 and associated Table S3.4 specify limits for total organic carbon (TOC) of <3% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

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

Air pollution control (APC) residues from flue gas treatment are hazardous waste and therefore must be sent for disposal to a landfill site permitted to accept hazardous waste, or to an appropriately permitted facility for hazardous

waste treatment. The amount of APC residues is minimised through optimising the performance of the air emissions abatement plant.

In order to ensure that the IBA 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 Application states that metal fractions will be recovered from the bottom ash and sent for recycling. The Application also proposes that, where possible, bottom ash will be transported to a suitable recycling facility, from where it could be re-used in the construction industry as an aggregate.

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 and other environmental impacts. 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 guidance 'risk assessments for your environmental permit'

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

guidance 'Air emissions risk assessment for your environmental permit' 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 emissions

The 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 methodology 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 Standards (ES). ES are described in our web guide 'Air emissions risk assessment for your environmental permit'.

Our web guide sets out the relevant ES as:

- Ambient Air Directive Limit Values
- Ambient Air Directive and 4th Daughter Directive Target Values
- UK Air Quality Strategy Objectives
- Environmental Assessment Levels

Where an Ambient Air Directive (AAD) Limit Value exists, the relevant standard is the AAD Limit Value. Where an AAD Limit Value does not exist, AAD target values, UK Air Quality Strategy (AQS) Objectives or Environmental Assessment Levels (EALs) are used. Our web guide sets out EALs which have been derived to provide a similar level of protection to Human Health and the

Environment as the AAD limit values, AAD target and AQS objectives. In a very small number of cases, e.g. for emissions of lead, the AQS objective is more stringent that the AAD value. In such cases, we use the AQS objective for our assessment.

AAD target values, AQS objectives and EALs do not have the same legal status as AAD limit values, and there is no explicit requirement to impose stricter conditions than BAT in order to comply with them. However, they are a standard for harm and any significant contribution to a breach is likely to be unacceptable.

PCs are screened out as **Insignificant** if:

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

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 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 exceedances of the relevant ES 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 exceedance of an AAD limit value is identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation or we may refuse the application if the Applicant is unable to provide suitable proposals. Whether or not exceedances are considered likely, the application is subject to the requirement to operate in accordance with BAT.

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

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

5.2 Assessment of Impact on Air Quality

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

- Dispersion modelling of emissions to air from the operation of the incinerator
- A study of the impact of emissions on nearby sensitive habitat / conservation sites
- A qualitative assessment of amenity impacts during construction
- A qualitative assessment of amenity impacts from additional traffic

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

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 5 and 6. dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of observed meteorological data collected from the weather station at *Loftus* between 2016 and 2020. The Applicant stated that Loftus is approximately 19 km to the east of the Installation and is the nearest and most appropriate for the purpose of providing data for an air dispersion modelling assessment.

In addition to the Loftus weather station data, one year (2020) of site specific modelled numerical weather prediction has also been used to take into account the flat topography in the vicinity of the Installation compared to the hilly terrain at Loftus.

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 15(3), Article 46(2) and Annex VI 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)
    - Ammonia (NH_3)

- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term ELVs, i.e. the maximum permitted emission rate.

- Third, the model also considered emissions of pollutants not covered by Annex VI of IED, specifically ,polycyclic aromatic hydrocarbons (PAH) and Polychlorinated biphenyls (PCBs). Emission rates used in the modelling have been drawn from data in the Waste Incineration BREF and are considered further in section 5.2.1.

The assessment of the air emissions from the Installation alone was done, and also a cumulative assessment with the nearby proposed, Redcar Energy Centre and Circular Fuels Arboretum di-methyl ether (DME) production plant.

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

Background concentrations were taken from the Air Pollution Information System (APIS) website.

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 Applicant's modelling predicted peak ground level exposure to pollutants in ambient air and at discreet receptors. The tables below show the ground level concentrations at the most impacted receptor.

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.

Pollutant	ES		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m³	Reference period	µg/m³	µg/m³	% of EAL	µg/m³	% of EAL
NO_2	40	Annual Mean	24.8	0.60	1.50	25.4	63.5
	200	99.79th %ile of 1-hour means		5.21	2.6		
PM_{10}	40	Annual Mean		0.04	0.10		
	50	90.41st %ile of 24-hour means		0.18	0.36		
$PM_{2.5}$	20	Annual Mean		0.04	0.20		
SO_2	266	99.9th %ile of 15-min means		5.06	1.9		
	350	99.73rd %ile of 1-hour means		4.36	1.25		
	125	99.18th %ile of 24-hour means		2.58	2.1		
HCl	750	1-hour average		1.53	0.204		
HF	16	Annual Mean		0.01	0.05		
	160	1-hour average		0.26	0.1625		
CO	10000	Maximum daily running 8-hour mean		7.16	0.07		
TOC	5	Annual Mean	0.355	0.09	1.72	0.44	8.82
PAH	0.00025	Annual Mean	0.000206	0.00	3.44	0.00021	85.8
NH_3	180	Annual Mean		0.86	0.48		
	2500	1-hour average		2.56	0.10		
PCBs	0.2	Annual Mean		6.87E-10	3.435E-07		
	6	1-hour average		2.04E-08	3.4E-07		

TOC as benzene
PAH as benzo[a]pyrene

Pollutant	ES		Back-ground	Process Contribution		Predicted Environmental Concentration	
	ng/m³	Reference period	ng/m³	ng/m³	% of EAL	ng/m³	% of EAL
Cd	5	Annual mean		0.172	3.4	0.17	3.4
Hg	250	Annual mean		0.172	0.07		
	7500	1-hour average		5.11	0.07		
Sb	5000	Annual mean		2.6	0.05		
	150000	1-hour average		76.90	0.05		
Pb	250	Annual mean	15.4	2.59	1.04	17.99	7.20
Cu	10000	Annual mean		2.59	0.03		
	200000	1-hour average		76.9	0.04		
Mn	1000	Annual mean		2.59	0.26		
	1500000	1-hour average		76.9	0.005		
V	5000	Annual mean		2.59	0.05		
	1000	24-hr average		34	3.40		
As	6	Annual mean	0.788	5.62	187.33	6.41	213.6
Cr (II)(III)	5000	Annual mean	0.749	2.59	0.05		
	150000	1-hour average	0.749	76.9	0.05		
Cr (VI)	0.25	Annual mean	0.75	2.59	1036.00	3.34	1336
Ni	20	Annual mean	1.24	2.59	12.95	3.83	19.2

(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 ES and <10% of the short-term ES. These are:

- PM10, SO_2, PM2.5, HCl, HF, CO, NH_3, PCBs and some metals

Therefore, 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 ES.

- NO_2, TOC, PAH and some metals

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

Finally, from the tables above the following emissions required further assessment.

- As and Cr(VI)

These substances are considered further in section 5.2.3.

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 ES 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 ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded. The peak short-term PC is below 10% of the ES and screens out as insignificant.

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

The impact on air quality from particulate emissions has been assessed against the ES for PM_{10} (particles of 10 microns and smaller) and $PM_{2.5}$ (particles of 2.5 microns and smaller). For PM_{10}, the ES 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 ES of 20 $\mu g/m^3$

as a long-term annual average was used, having changed from 25 μg/m^3 in 2020.

The Applicant's predicted impact of the Installation against these ESs 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, while actual emissions from similar plant are normally lower.

- 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 ES and below 10% of the short-term ES and so can be screened out as insignificant. Therefore 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 ES. Therefore the Environment Agency concludes that particulate emissions from the Installation, including emissions of PM_{10} or $PM_{2.5}$, will not give rise to significant pollution.

There is currently no emission limit prescribed nor any continuous emissions monitoring 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 (IC2) 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, as explained in section 5.3.3.

(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 ES. There is no long-term ES for HCl. HF can be screen out as insignificant assessment criteria as the process contribution is <1% of the annual ES and < 10 of the short-term ES.

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 ES is considered in section 5.4.

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

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

The above tables show that for CO emissions, the peak long-term PC is less than 1% of the ES. A short-term emission has not been assessed. We have assessed varying emission concentrations against the short-term ES, and the emission is deemed to be insignificant.

The above tables show that for TOC emissions, the peak long-term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded.

The Applicant has used the ES for benzene for their assessment of the impact of TOC.

The above tables show that for PAH emissions, the peak long-term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded.

The Applicant has also used the ES for benzo[a]pyrene (BaP) for their assessment of the impact of PAH. We agree that the use of the BaP ES is sufficiently precautionary.

PCBs can be screened out as insignificant in that the process contribution is < 1% of the long-term ES and <10% of the short-term ES.

We consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

There is no ES 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

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

However, at 10 mg/m^3 there are significant nutrient deposition rates identified at some sensitive habitat sites, therefore we have set a lower emission limit of 3.5 mg/m^3 for ammonia. (See Section 5.4.4).

Whilst all emissions cannot be screened out as insignificant, the Applicant's modelling shows that the Installation is unlikely to result in a breach of the ES. The Applicant is required to prevent, minimise and control PAH and VOC emissions using BAT, this is considered further in Section 6. We are satisfied that PAH and TOC emissions will not result in significant pollution.

(V) Summary

For the above emissions to air, for those emissions that do not screen out, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the BAT to prevent and minimise emissions of these substances. This is reported in section 6 of this document. Therefore, we consider the Applicant's proposals for preventing and minimising emissions to be BAT for the Installation. Dioxins and furans are considered further in section 5.3.2.

5.2.3 Assessment of Emission of Metals

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

There are three sets of BAT AELs for metal emissions:

- An emission limit value of 0.02 mg/m^3 for mercury and its compounds (formerly WID group 1 metals).
- An aggregate emission limit value of 0.02 mg/m^3 for cadmium and thallium and their compounds (formerly WID group 2 metals).
- An aggregate emission limit of 0.3 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.

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

- Hg, Sb, Cu, Mn, V and Cr (II)(III)

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

- Cd, Pb, and Ni

This left emissions of As and Cr (VI) requiring further assessment. For all other metals, the Applicant has concluded that exceedances of the EAL for all metals are not likely to occur.

Where the BAT conclusions 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.

For metals As and Cr (VI) the Applicant used representative emissions data from other municipal waste incinerators using our guidance note Please refer to "Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – version 4". 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.

Data for Cr (VI) was based on total Cr emissions measurements and the proportion of total Cr to Cr (VI) in APC residues.

Based on the above, the following emissions of metals were screened out as insignificant:

- Cr (VI)

The following emissions of metals whilst not screened out as insignificant were assessed as being unlikely to give rise to significant pollution:

- As

The Installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document.

Improvement Condition (IC6) requires the Operator to assess the impacts of Cr (VI) and As using measured emission test results.

5.2.4 Consideration of Local Factors

The air quality modelling also assessed cumulative impacts of the ERF with a nearby proposed development, Redcar Energy Centre and Circular Fuels Arboretum di-methyl ether (DME) production plant Both the proposed Installations will include incineration of either waste or waste derived fuel in their processes.

The cumulative assessment assumed that all 3 plants operated at maximum permitted emission limits continuously. This conservative approach did show an increase in ground level concentrations for all the species modelled.

These emissions below required further assessment and were modelled at sensitive receptors.

- Cr(vi), PAH and TOC

Whilst all emissions did not screen out as insignificant they were assessed as being unlikely to give rise to significant pollution.

(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 ambient air directive (AAD).

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 may in some circumstances dictate tighter emission limits and controls than those set out in the BAT conclusions or 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. The gathering of evidence is a continuing process. Although gathering evidence is not our role we keep the available evidence under review. The 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."

HPA (now UKHSA) in 2009 stated 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".

In 2012 the UK Small Area Health Statistics Unit (SAHSU) at Imperial College was commissioned by Public Heath England (PHE) to carry out a study to extend the evidence base and to provide further information to the public about any potential reproductive and infant health risks from municipal waste incineration (MWIs).

A number of papers have been published by SAHSU since 2012 which show no effect on birth outcomes. One paper in the study looked at exposure to emissions from MWIs in the UK and concluded that exposure was low. Subsequent papers found no increased risk of a range of birth outcomes (including stillbirth and infant mortality) in relation to exposure to PM10 emissions and proximity to MWIs, and no association with MWIs opening on changes in risks of infant mortality or sex ratio.

The final part of the study, published on 21/06/19, found no evidence of increased risk of congenital anomalies from exposure to MWI chimney emissions, but a small potential increase in risk of congenital anomalies for children born within ten kilometres of MWIs. The paper does not demonstrate

a causal effect, and it acknowledges that the observed results may well be down to not fully adjusting the study for factors such as other sources of pollution around MWIs or deprivation.

PHE have stated that 'While the conclusions of the study state that a causal effect cannot be excluded, the study does not demonstrate a causal association and makes clear that the results may well reflect incomplete control for confounding i.e. insufficiently accounting for other factors that can cause congenital anomalies, including other sources of local pollution. This possible explanation is supported by the fact no increased risk of congenital anomalies was observed as a result of exposure to emissions from an incinerator.'

Following this study, PHE have further stated that 'PHE's position remains that modern, well run and regulated municipal waste incinerators are not a significant risk to public health, and as such our advice to you [i.e. the Environment Agency] on incinerators is unchanged.'

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 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, furans and dioxin like PCBs, 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.

Models are available to predict the dioxin, furan and dioxin like PCBs 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 include the HHRAP 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 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, furans and dioxin like PCB's of 2 picograms WHO-TEQ/Kg-body weight/day (N.B. a picogram is a millionth of a millionth (10-12) of a gram).

In addition to an assessment of risk from dioxins, furans and dioxin like PCB's, the HHRAP model enables a risk assessment from human intake of a range of heavy metals. In principle, the respective ES 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 the 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 methodology set out in our guidance for comparison for most pollutants (including metals) and dioxin intake model using the HHRAP model as described above for dioxins, furans and dioxin like PCBs. Where an alternative approach is adopted for dioxins, we check the predictions ourselves.

v) Consultations

As part of our normal procedures for the determination of a permit application, we consult with Local Authorities, Local Authority Directors of Public Health, FSA and UKHSA. We also consult the local communities who may raise health related issues. All issues raised by these consultations are considered in determining the application as described in Annex 4 of this document.

5.3.2 Assessment of Intake of Dioxins, Furans and Dioxin like PCBs

For dioxins, furans and dioxin like PCBs, 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 their food and water were sourced from the locality where the deposition of dioxins, furans and dioxin like PCBs is predicted to be the highest. This is then assessed against the Tolerable Daily Intake (TDI) levels established by the COT of 2 picograms WHO-TEQ / Kg bodyweight/ day.

The results of the Applicant's assessment of dioxin intake are detailed in the table below. (worst – case results for each category are shown). The results showed that the predicted daily intake of dioxins, furans and dioxin like PCBs at all receptors, resulting from emissions from the proposed facility, were significantly below the recommended TDI levels.

Receptor	Child		Adult	
	WHO-TEQ pg/kg b.w./day	% of TDI	WHO-TEQ pg/kg b.w./day	% of TDI

Residential (R13)	0.00239	0.12	0.000727	0.04
Agricultural (R16)	0.00657	0.33	0.00453	0.23

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. A report in 2012 showed that Dioxin and PCB levels in food have fallen slightly since 2001. In 2001, the average daily intake by adults in the UK from diet was 0.9 pg WHO-TEQ/kg bodyweight. The additional daily intake predicted by the modelling as shown in the table above is substantially below this figure.

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

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

5.3.3 Particulates smaller than 2.5 microns

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

Nano-particles are considered to refer to those particulates less than 0.1 µm in diameter ($PM_{0.1}$). Questions are often raised about the effect of nano-particles on human health, in particular on children's health, because of their high

surface to volume ratio, making them more reactive, and their very small size, giving them the potential to penetrate cell walls of living organisms. The small size also means there will be a larger number of small particles for a given mass concentration. However the HPA statement (referenced below) says that due to the small effects of incinerators on local concentration of particles, it is highly unlikely that there will be detectable effects of any particular incinerator on local infant mortality.

The HPA (now PHE) 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. PHE note that the coefficients that allow the use of number concentrations in impact calculations have not yet been defined because the national experts have not judged that the evidence is sufficient to do so. This is an area being kept under review by COMEAP.

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

PHE 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. PHE noted 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 $PM_{0.1}$. The National Atmospheric Emissions Inventory (NAEI) figures show that in 2016 municipal waste incineration contributed 0.03% to ambient ground level PM_{10} levels and 0.05% to ambient ground level PM2.5 levels. The 2016 data also shows that road traffic contributed to 5.35% of PM10 and 4.96% of PM2.5 and that domestic wood burning contributed 22.4% to PM10 and 34.3% of PM2.5 levels.

This is consistent with the assessment of this application which shows emissions of PM_{10} to air to be insignificant.
A 2016 a paper by Jones and Harrison concluded that 'ultrafine particles (<100nm) in flue gases from incinerators are broadly similar to those in urban air and that after dispersion with ambient air ultrafine particle concentrations are typically indistinguishable from those that would occur in the absence of the incinerator.

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 UKHAS 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 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 has shown that emissions screen out as insignificant or where the impact of emissions 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.

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 relevant 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.

United Kingdom Health Security Agency and the Local Authority Director of Public Health were consulted on the Application. No concerns regarding the risk to the health of humans from the Installation were raised The Food Standards Agency was also consulted during the permit determination process and did not raise any concern. Details of the responses provided to the consultation on this Application can be found in Annex 4.
The Environment Agency is therefore satisfied that the Applicant's conclusions presented above are soundly based and we conclude that the potential

emissions of pollutants including dioxins, furans and metals from the proposed facility are unlikely to have an impact upon human health.

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

5.4.1 Habitats Assessment

For each receptor the site's modelled emissions or process contribution (PC) is compared to relevant critical levels. Long-term process contributions can be screened out if they are less than 1 % of the critical level. Short-term emissions are screen out if they are less than 10 % of the critical level.

Where an emission cannot be screened out as insignificant, it does not mean it will necessarily be significant. In these cases, background concentrations are considered and, in some cases, a detailed assessment of the local habitat features.

If we consider that emissions **would cause significant pollution**, we would refuse the Application.

5.4.2 Sites Considered

The following Special Area of Conservation (SAC) and Special Protection Area (SPA) is located within 10Km of the Installation:

- North York Moors (SAC and SPA), approximately 9.6 km to the south.

The Teesmouth and Cleveland Coast ecological site covers a large area with a number of Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar and Special Sites of Scientific Interest (SSSI) habitat sites. These sites are located to the northwest, north and northeast of the installation at distances ranging from approximately 1.5 km and 6 km.

- Teesmouth and Cleveland Coast (SPA & SSSI)
- Teesmouth and Cleveland Coast (SPA & Ramsar)
- Teesmouth and Cleveland Coast (SSSI)

Receptor locations assessed are listed in the tables below, (NYM1 and TCC1 to TCC14).

Ecological receptors assessed

ADMS Ref.	Name	Designation	Easting (X)	Northing (Y)	Distance from Source (m)	Heading (degrees)
NYM1	North York Moors	SAC, SPA	458895	512978	9565	152
TCC1	Teesmouth and Cleveland Coast	SPA, SSSI	453277	522462	1524	314
TCC2			454760	523212	1842	12
TCC3			454282	523483	2075	357
TCC4			452203	521269	2181	266
TCC5		SPA, Ramsar	453002	522482	1745	308
TCC6			452430	521870	2003	283
TCC7			451970	521355	2410	269
TCC8			454304	524213	2804	358
TCC9			455670	524302	3167	24
TCC10			450882	522960	3825	294
TCC11			453572	525627	4294	349
TCC12			451681	525099	4570	324
TCC13			456614	525978	5085	26
TCC14		SSSI	453880	526160	4776	354

5.4.3 Habitats and SSSI Assessment

The Applicant's habitats and SSSI assessment was reviewed by our technical specialists for air dispersion modelling and assessment and specialists for habitats and conservation who agreed with the assessment's conclusions, that there would be no likely significant effect on the interest features of the protected sites and the proposal does not damage the special features of the SSSIs.

We have provided our assessment to Natural England, and they agree with our conclusions.

Predicted concentrations of long-term and short-term NOx

	Pollutant	NO_x (annual mean)	NO_x (24-hour mean)
	Critical Level	30	75
	Maximum PC (µg/m³)	**0.393**	3.85
	Max PC as % of Critical Level	**1.31%**	5.14%
NYM1	North York Moors - SAC / SPA	0.0316	0.392
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI	0.188	3.85
TCC2		**0.393 (1.31%)**	3.35
TCC3		0.247	2.98
TCC4		0.109	2.28
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar	0.178	3.82
TCC6		0.188	2.78
TCC7		0.101	2.01
TCC8		0.173	2.05
TCC9		**0.312 (1.04%)**	1.75
TCC10		0.100	1.37
TCC11		0.0878	1.11
TCC12		0.0602	1.05
TCC13		0.205	1.22
TCC14	Teesmouth and Cleveland Coast - SSSI	0.0849	1.11

The table above shows short-term NO_x screens out because it is less than 10% of the critical level.

The table above shows process contributions at receptors TCC2 (1.31 %) and TCC 9 (1.04 %) do not screen out as insignificant, because they are more than 1% of the critical level.

The applicant took the next step in the screening process, using the background NO_x concentrations to calculate the predicted environmental concentration (PEC).
If the PEC is less than 100% of the critical level, the emission will not have a significant effect.

TCC2

The PEC for TCC2 is 36.16 µg/m^3 or 121 % of the critical level.

TCC2 is located within the Tees Dock which is a busy facility surrounded by dock walls. This area alongside the quay appears to show mainly open water. It is also noted that this area appears to contain no intertidal habitat (which is expected for a

key dock facility) or other coastal priority habitats. Small, localised areas of intertidal mudflats are much further into the main estuary.

Mudflats particularly at Seal Sands area, saltmarsh and sand dunes are particularly important areas for qualifying birds. Seal Sands area is located just over 2.5km North-west from TCC2 where NO_x emissions from this facility screen out as insignificant.

Tern species may feed within the river Tees and associated waterbodies that could include the TCC2 location whereas most of the other qualifying species are likely to feed in more distant areas like Seal Sands. However tern nesting sites are generally found in the outer Tees Estuary, it can also be noted that tern species are piscivorous and that the predicted NO_x changes are not likely to affect prey availability.

We therefore conclude that there is no likely significant effect on the interest features of the site at this location from NO_x emissions.

TCC9

The PEC for TCC9 is 28.53 µg/m^3 or 95 % of the critical level.

We conclude that for location TCC9 there will be no adverse effect because the PC is low at only 1.04% and the PEC is still less than 100 % of the critical level.

Predicted concentrations of long-term SO2

	Pollutant	SO_2 (annual mean)
	Critical Level (µg/m³)	20 [(a)]
	Maximum PC (µg/m³)	0.120
	Max PC as % of Critical Level	0.60%
NYM1	North York Moors - SAC / SPA	0.0101
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI	0.0574
TCC2		0.120
TCC3		0.0755
TCC4		0.0333
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar	0.0545
TCC6		0.0573
TCC7		0.0307
TCC8		0.0536
TCC9		0.0962
TCC10		0.0262
TCC11		0.0226
TCC12		0.0153
TCC13		0.0518
TCC14	Teesmouth and Cleveland Coast - SSSI	0.0216

The table above shows SO_2 screens out because the maximum process contribution, at all the receptors assessed, is 0.6%, less than 1%.

Predicted concentrations of long-term NH_3

		Pollutant	NH_3 (annual mean) - Other Vegetation
		Critical Level (µg/m³)	3 [(a)]
		Maximum PC (µg/m³)	**0.0398**
		Max PC as % of Critical Level	**1.33%**
NYM1	North York Moors – SAC / SPA		0.00337
TCC1	Teesmouth and Cleveland Coast – SPA / SSSI		0.0191
TCC2			**0.0398 (1.33%)**
TCC3			0.0251
TCC4			0.0111
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar		0.0181
TCC6			0.0190
TCC7			0.0102
TCC8			0.0178
TCC9			**0.0320 (1.07%)**
TCC10			0.00812
TCC11			0.00701
TCC12			0.00471
TCC13			0.0159
TCC14	Teesmouth and Cleveland Coast - SSSI		0.00666

The table above shows long-term NH_3 PCs at TCC2 (1.33 %) and TCC9 (1.07 %). Therefore, the Teesmouth and Cleveland Coast SPA/Ramsar did not screen out because the process contribution is more than 1% of the critical level.

Receptors TCC2 and TCC9 are further assessed below.

We disagreed with the applicant's use of 3 µg/m^3 for the NH_3 critical level at receptors TCC11, TCC13 and TCC14. This is because bryophytes and lichens are present. We asked the applicant to remodel at these receptors using a lower critical level of 1 µg/m^3.

The applicant remodelled the NH_3 emissions using a lower NH_3 limit of 3.5 mg/m^3, discussed below. These were compared to the more stringent critical level of 1 µg/m^3.

Revised predicted concentrations of long-term NH_3

Receptor Ref.		NH_3 (annual mean)		
		Long Term PC ($\mu g/m^3$)	Long Term Critical Level (CL) ($\mu g/m^3$)	Long Term PC as a % of the CL ($\mu g/m^3$)
TCC11	Teesmouth and Cleveland Coast - SPA / Ramsar	0.00244	1	0.24%
TCC13		0.00551		0.55%
TCC14	Teesmouth and Cleveland Coast - SSSI	0.00229		0.23%

The table above shows the revised modelling data. The NH_3 emissions now screen out because all the long-term process contributions are less than 1 % of the critical level.

Receptors TCC2 and TCC9, did not screen out, in the original modelling, using the BAT-AEL emission of 10 mg/m^3 NH_3.

Reducing the NH_3 emissions modelled to the lower 3.5 mg/m^3 concentration would reduce the process contribution by approximately one-third. Therefore, we can be confident the process contributions screen out because they would drop below 1 % of the critical level.

Based on this assessment the NH_3 limit has been set in the permit at 3.5 mg/m^3, which is lower than the BAT-AEL of 10 mg/m^3. See section 5.4.4.

Predicted concentrations of short-term HF

	Pollutant	HF (weekly mean)	HF (daily mean)
	Critical Level (µg/m³)	0.5	5
	Maximum PC (µg/m³)	**0.0187**	0.0389
	Max PC as % of Critical Level	**3.74%**	0.78%
NYM1	North York Moors - SAC / SPA	0.00238	0.00442
TCC1	Teesmouth and Cleveland Coast - SPA / SSSI	**0.0146 (2.92%)**	0.0389
TCC2		**0.0187 (3.74%)**	0.0337
TCC3		**0.0120 (2.40%)**	0.0300
TCC4		**0.0118 (2.37%)**	0.0229
TCC5	Teesmouth and Cleveland Coast - SPA / Ramsar	**0.0149 (2.98%)**	0.0386
TCC6		**0.0145 (2.90%)**	0.0280
TCC7		**0.0104 (2.07%)**	0.0203
TCC8		**0.00864 (1.73%)**	0.0209
TCC9		**0.00808 (1.62%)**	0.0177
TCC10		**0.00651 (1.30%)**	0.0140
TCC11		0.00452	0.0115
TCC12		**0.00514 (1.03%)**	0.0106
TCC13		**0.00533 (1.07%)**	0.0126
TCC14	Teesmouth and Cleveland Coast - SSSI	0.00436	0.0119

The table above shoes HF screens out because the maximum process contribution (3.74 %) is less than 10 % of the short-term critical level and the long-term process contribution (0.78 %) is less than 1 % of the critical level

The applicant did not include HCl in their modelling however our sensitivity checks did and came to the same conclusion, that PCs screen out under the significance criteria.

Nutrient nitrogen

Nutrient nitrogen deposition rates are affected by NH_3 emissions. The applicant proposed reduced NH_3 limits of 3.5 mg/m^3 (compared to their initial modelling which used the BAT-AEL 10 mg/m^3), reducing the nutrient nitrogen deposition.

The tables below show the nutrient nitrogen deposition rates, based on the lower NH_3 emission concentration.

The nutrient nitrogen deposition rates are less than 1% of the critical load, at all the modelled receptors.

Based on this assessment the NH_3 limit has been set in the permit at 3.5 mg/m^3, which is lower than the BAT-AEL of 10 mg/m^3. See section 5.4.4.

Predicted nutrient nitrogen deposition concentrations

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [a] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
NYM1	North York Moors – SAC (Blanket Bogs – Raised and blanket bogs)	5	10	0.0153	0.31%	0.15%	n/a	n/a	n/a	n/a
	North York Moors – SPA (European Golden Plover – Reproducing – Montane habitats)	5	10	0.0153	0.31%	0.15%	n/a	n/a	n/a	n/a
TCC1	Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type)	10	15	0.106	**1.06%**	0.71%	8.96	9.07	91%	60%
TCC2				0.202	**2.02%**	**1.35%**		9.16	92%	61%
TCC3				0.138	**1.38%**	0.92%		9.10	91%	61%
TCC4				0.0631	0.63%	0.42%	n/a	n/a	n/a	n/a

Predicted nutrient nitrogen deposition concentrations (continued)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [a] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)	PEC as % of Lower Critical Load	PEC as a% of Upper Critical Load
TCC5	Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type)	10	15	0.0995	0.99%	0.66%	n/a	n/a	n/a	n/a
TCC6				0.107	**1.07%**	0.71%	8.96	9.07	91%	60%
TCC7				0.0578	0.58%	0.39%	n/a	n/a	n/a	n/a
TCC8				0.0945	0.95%	0.63%	n/a	n/a	n/a	n/a
TCC9				0.168	**1.68%**	**1.12%**	8.4	8.57	86%	57%
TCC10				0.0522	0.52%	0.35%	n/a	n/a	n/a	n/a
TCC11				0.0453	0.45%	0.30%	n/a	n/a	n/a	n/a
TCC12				0.0306	0.31%	0.20%	n/a	n/a	n/a	n/a
TCC13				0.103	**1.03%**	0.69%	9.1	9.20	92%	61%
TCC14	Coastal stable dune grasslands (calcareous type)	10	15	0.0432	0.43%	0.29%	n/a	n/a	n/a	n/a

Revised predicted nutrient nitrogen deposition concentrations

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [a] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)
TCC1	Teesmouth and Cleveland Coast – SPA & SSSI (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0524	0.524%	0.349%	n/a	n/a
TCC2				0.0964	0.964%	0.643%	n/a	n/a
TCC3				0.0637	0.637%	0.425%	n/a	n/a
TCC4				0.0285	0.285%	0.190%	n/a	n/a
TCC5	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0482	0.482%	0.321%	n/a	n/a
TCC6				0.0469	0.469%	0.313%	n/a	n/a
TCC7				0.0260	0.260%	0.173%	n/a	n/a
TCC8				0.0437	0.437%	0.291%	n/a	n/a
TCC9				0.0786	0.786%	0.524%	n/a	n/a

Revised predicted nutrient nitrogen deposition concentrations (continued)

ADMS Ref.	Site Details	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Nutrient Nitrogen Deposition Rate [a] (kgN/ha/yr)	PC as a % of Lower Critical Load	PC as a % of Upper Critical Load	Background Concentration (kgN/ha/yr)	PEC (kgN/ha/yr)
TCC10	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	10	15	0.0239	0.239%	0.159%	n/a	n/a
TCC11				0.0216	0.216%	0.144%	n/a	n/a
TCC12				0.0164	0.164%	0.109%	n/a	n/a
TCC13				0.0492	0.492%	0.328%	n/a	n/a
TCC14	Teesmouth and Cleveland Coast (SSSI Coastal stable dune grasslands (calcareous type))	10	15	0.0204	0.204%	0.136%	n/a	n/a

Acid deposition

The tables below show the acid deposition rates due to PCs are less than 1 % threshold of the critical load at all the modelled locations, therefore it can be screened out.

No further assessment is required

Predicted acid deposition concentrations with critical loads

ADMS Ref.	Site Details	PC N (keq/Ha/yr)	BG N (keq/ha/yr)	PC S (keq/Ha/yr)	BG S (keq/ha/yr)	CL MinN (keq/ha/yr)	CLMaxN (keq/ha/yr)	CLMaxS (keq/ha/yr)	PEC N (keq/ha/yr)	PEC S (keq/ha/yr)	PC as % of CL	Total PEC (keq/ha/yr)	PEC as % of CL
NYM1	North York Moors – SAC (Blanket Bogs – Raised and blanket bogs)	0.00109	1.36	0.00119	0.18	0.321	0.504	0.183	1.36	0.181	0.45%	n/a	n/a
	North York Moors – SPA (European Golden Plover – Reproducing – Montane habitats)	0.00109	1.36	0.00119	0.18	0.178	0.471	0.150	1.36	0.181	0.48%	n/a	n/a
TCC1	Teesmouth and Cleveland Coast – SPA (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	0.00754	1.03	0.00833	0.20	0.856	4.856	4.00	1.04	0.208	0.33%	n/a	n/a
TCC2		0.0157	1.03	0.0173	0.20	0.856	4.856	4.00	1.05	0.217	0.68%	n/a	n/a
TCC3		0.00984	1.03	0.0109	0.20	0.856	4.856	4.00	1.04	0.211	0.43%	n/a	n/a
TCC4		0.00449	1.03	0.00495	0.20	0.856	4.856	4.00	1.03	0.205	0.19%	n/a	n/a

Predicted acid deposition concentrations with critical loads (continued)

ADMS Ref.	Site Details	PC N (keq/Ha/yr)	BG N (keq/ha/yr)	PC S (keq/Ha/yr)	BG S (keq/ha/yr)	CL MinN (keq/ha/yr)	CL MaxN (keq/ha/yr)	CL MaxS (keq/ha/yr)	PEC N (keq/ha/yr)	PEC S (keq/ha/yr)	PC as % of CL	Total PEC (keq/ha/yr)	PEC as % of CL
TCC1 – TCC4 & TCC14	Teesmouth and Cleveland Coast - SSSI	No information currently held / accessible via APIS' portal											
TCC5	Teesmouth and Cleveland Coast – SPA / Ramsar (Sandwich Tern / Little Tern - Supralittoral sediment - Coastal stable dune grasslands (calcareous type))	0.00708	1.03	0.00783	0.20	0.856	4.856	4.00	1.04	0.208	0.31%	n/a	n/a
TCC6		0.00759	1.03	0.00838	0.20	0.856	4.856	4.00	1.04	0.208	0.33%	n/a	n/a
TCC7		0.00411	1.03	0.00453	0.20	0.856	4.856	4.00	1.03	0.205	0.18%	n/a	n/a
TCC8		0.00673	1.03	0.00742	0.20	0.856	4.856	4.00	1.04	0.207	0.29%	n/a	n/a
TCC9		0.0120	1.01	0.0132	0.23	0.856	4.856	4.00	1.02	0.243	0.52%	n/a	n/a
TCC10		0.00372	1.03	0.00411	0.20	0.856	4.856	4.00	1.03	0.204	0.16%	n/a	n/a
TCC11		0.00322	1.07	0.00354	0.28	0.856	4.856	4.00	1.07	0.284	0.14%	n/a	n/a
TCC12		0.00218	1.07	0.00239	0.28	0.856	4.856	4.00	1.07	0.282	0.09%	n/a	n/a
TCC13		0.00734	0.75	0.00808	0.25	0.856	4.856	4.00	0.757	0.258	0.20%	n/a	n/a

5.4.4 Ammonia emission limit

To demonstrate emissions of NH_3 have no significant impact, the applicant used a reduced ammonia emission concentration of 3.5 mg/m^3 compared to the BAT-AEL of 10 mg/m^3.

At the lower emission concentration, assessments showed that ammonia and nutrient nitrogen deposition screened out at all receptors modelled.

The applicant provided emissions monitoring data, from a similarly designed plant, showing NH_3 emissions of 1.5 mg/m^3 with a controlled NO_x emission of 130 mg/m^3.

Consequently, the NH_3 limit in the permit has been set at 3.5 mg/m^3, to ensure the emissions do not have a significant impact.

The permit includes an improvement condition (IC5) requiring the Operator to report to the Environment Agency on optimising the performance of the SNCR. This includes measuring and reporting emissions of ammonia.

5.5 Impact of abnormal operations

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

For incineration plant, IED sets backstop limits for particulates, CO and TOC which must continue to be met at all times. 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) of the IED.

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 ES. For the most part therefore consideration of abnormal operations is limited to consideration of its impact on short-term ESs.

In making an assessment of abnormal operations the following scenario has been assumed by the Applicant;

- NO_x emissions of 400 mg/m^3 (at the half hour limit)
- Particulate emissions of 29.2 mg/m^3 (based on 4 hours 150 mg/m^3 and 20 hours at (5 mg/m^3)
- SO_2 emissions of 200 mg/m^3 (at the half hour limit)
- TOCs (as benzene) (at the half hour limit)
- HCl emissions of 60 mg/m^3 (at the half hour limit)
- HF emissions of 4 mg/m^3 (at the half hour limit)

Pollutant	ES		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m³	Reference period	µg/m³	µg/m³	% of EAL	µg/m³	% of EAL
NO_2	200	1-hr average	25.42	35.82	17.9	61.24	30.6
PM_{10}	50	24-hour average		2.11	4.22	2.11	4.2
SO_2	266	15 minute average		33.6	12.6	33.6	12.6
	350	1-hr average		29	8.29	29	8.3
	125	24-hour average		17.1	13.68	17.1	13.7
HCl	750	1-hr average		0.516	0.0688	0.5	0.07
HF	160	1-hr average		1.02	0.6375	1.02	0.6

From the table above the emissions of the following substances can still be considered insignificant, in that the PC is still <10% of the short-term ES:

- PM10, HCl & HF

Also, from the table 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% of the short-term ES:

- NO_2, & SO_2

We have further assessed abnormal operations, considering 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 releases assessed are below:

- NO_x emissions of 500 mg/m³ (1.25 x short-term ELV)
- PM_{10} emissions of 150 mg/m³ (5 x short-term ELV)
- SO_2 emissions of 400 mg/m³ (2 x short-term ELV)
- HCl emissions of 900 mg/m³ (15 x the short-term ELV)
- HF emissions of 12 mg/m³ (2 x the short-term ELV)
- Mercury and metals emissions (5 x normal)
- PCB emissions (10 x normal)

Whilst the above emissions would not be considered insignificant, they have been assessed as being unlikely to give rise to significant pollution.

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

We have not assessed the impact of abnormal operations against long-term ESs for the reasons set out above. Except that if dioxin emissions were at 10 ng/m^3 for the maximum period of abnormal operation the TDI would be as follows:

Receptor	Child		Adult	
	WHO-TEQ pg/kg b.w./day	% of TDI	WHO-TEQ pg/kg b.w./day	% of TDI
Residential (R13)	0.0063	0.32	0.002059	0.1
Agricultural (R16)	0.019	0.93	0.012747	0.64

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. The BAT conclusions were published in December 2019.

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

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

6.1.1 Consideration of Furnace Type

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

The BREF states that Municipal Waste can be incinerated in traveling grates, rotary kilns and fluidised bed technology. Fluidised bed technology requires MSW to be of a certain particle size range, which usually requires some degree of pre-treatment even when the waste is collected separately.
The BREF describes other process such as gasification and pyrolysis. The BREF notes that some of the processes have encountered technical and economic problems when scaled up to commercial, industrial sizes. Some are used on a commercial basis in Japan and are being tested in demonstration plants in Europe but still only have a small share of overall capacity.

Section 4.3 of the BREF provides a comparison of combustion and thermal treatment technologies, used in Europe and factors affecting their applicability and operational suitability for various waste types. 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 NO_x as the furnace choice could have an effect on the amount of unabated NO_x produced
- energy consumption – whole plant, waste preparation, effect on GWP
- need, if any, for further processing of residues to comply with TOC
- costs

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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Moving grate (air-cooled)	• Low to medium heat values (LCV 5 – 16.5 GJ/t) • Municipal and other • heterogeneous solid wastes • Can accept a proportion of sewage sludge and/or medical waste with municipal waste • Applied at most modern • MSW Installations	• 1 to 50 t/h with most projects 5 to 30 t/h. • Most industrial applications not below 2.5 or 3 t/h.	• Widely proven at large scales. • Robust • Low maintenance cost • Long operational history • Can take heterogeneous wastes without special • preparation	• Generally not suited to powders, liquids or materials that melt through the grate	TOC 0.5% to 3%	High capacity reduces specific cost per tonne of waste
Moving grate (liquid Cooled)	Same as air-cooled grates except: LCV 10 – 20 GJ/t	Same as air-cooled grates	As air-cooled grates but: • higher heat value waste is treatable • Better combustion control possible.	As air-cooled grates but: • risk of grate damage/ leaks • 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 as well as gases Solid feeds more limited than grate (due to refractory damage) often applied to hazardous Wastes	<16 t/h	• Very well proven • Broad range of wastes • Good burn out even of HW	Throughputs lower than grates	TOC <3 %	Higher specific cost due to reduced capacity
Fluid bed - Bubbling	• Wide range of CV (5-25 MJ/kg) • Only finely divided • consistent wastes. • Limited use for raw MSW • Often applied to sludges co fired with RDF, shredded MSW, sludges, poultry manure	Up to 25 t/h	• Good mixing • Fly ashes of good leaching quality	• Careful operation required to avoid clogging bed. • Higher fly ash quantities.	TOC <1%	FGT cost may be lower. Costs of waste preparation
Fluid bed - circulating	• Wide range of CV (6-25 MJ/kg) • Only finely divided consistent wastes. • Limited use for raw MSW • Often applied to sludges co-fired with RDF, coal, wood waste	Up 70 70 t/h	• Good mixing • High steam parameters up to 500oC • Greater fuel flexibility than BFB • Fly ashes of good leaching quality	• Cyclone required to conserve bed material • Higher fly ash quantities	TOC <1%	• FGT cost may be lower. • Costs of waste preparation

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
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	Up 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 operating/ maintenance costs
Gasification - entrained flow	• Mixed plastic wastes • Other similar consistent streams • Not suited to untreated MSW • Gasification less widely used/proven than incineration	Up 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 • High pre-treatment costs
Gasification - fluidised bed	• Mixed plastic wastes • Shredded MSW • Shredder residues • Sludges • Metal rich wastes • Other similar consistent streams • Gasification less widely used/proven than incineration	5 – 20 t/h	• Can use low reactor temperatures e.g. for Al recovery • Separation of main 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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Pyrolysis	• Pre-treated MSW • High metal inert streams • Shredder residues/plastics • Pyrolysis is less widely used/proven than incineration	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	• No oxidation of metals • No combustion energy for metals/inert • In reactor acid neutralisation possible • Syngas available	• Limited wastes • Process control and engineering critical • High skill level • Not widely proven • Need market for syngas	• Dependent on process temperature • Residue produced requires further processing and sometimes combustion	High pre-treatment, operation and capital costs

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

- fixed stepped hearth
- moving grate
- pulsed hearth
- rotary kiln
- fluidised bed
- pyrolysis, and gasification

With a more detailed assessment of:

- moving grate
- rotary kiln
- fluidised bed

The Applicant has proposed to use a furnace technology comprising of a moving grate which is identified in the tables above as being considered BAT in the BREF or TGN for this type of waste feed.

The Applicant proposes to use gasoil as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on the lack of gas availability.

Boiler Design

In accordance with BAT 30 of the BATC and our Technical Guidance Note, EPR 5.01, 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:

- provide a high residence time for the flue gases at high temperatures, thereby giving complete burnout of the waste on the grate;
- ensuring high heat transfer in the refractory material in order to achieve low surface temperatures, thereby avoiding deposits on the refractory surface;
- cooling the flue gas within the limited height of the first pass
- low velocity of the flue gas in the combustion chamber in order to reduce ash carry-over;
- on-line cleaning systems based on water injection in the second and third passes and mechanical raking devices on the horizontal pass

Any of the options listed in the BREF and summarised in the table above can be BAT. The Applicant has chosen a furnace technique that is listed in the BREF and we are satisfied that the Applicant has provided sufficient justification to show that their technique is BAT. This is not to say that the other techniques could not also be BAT, but that the Applicant has shown that their chosen technique is at least comparable with the other BAT options. 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 Flue Gas Cleaning System (FGC) 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 (FGC) systems as:

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

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 Higher energy use than ESP	Multiple compartments Bag burst detectors	Most plants

		Sensitive to condensation and corrosion		
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 (ESP)	Low pressure gradient. Use with BF may reduce the energy consumption of the induced draft fan.	Not normally BAT by itself Risk of dioxin formation if used in 200-400^{o}C range		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 screened out as insignificant, and so the Environment Agency agrees that the Applicant's proposed technique is BAT for the Installation.

In this case, it is not considered that any of the alternate techniques offer any advantage in comparison with the Applicant's preferred option of fabric filters and so agrees that the Applicant's proposed technique is BAT for the Installation.

6.2.2 Oxides of Nitrogen

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

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 40-150mg/ m^3 Reduces CO, TOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
SCR by catalytic filter bags	50-120 mg/m^3			Applicable to new and existing plants with or without existing SNCR. Can be used with NH_3 as slip catalyst with SNCR

Selective non-catalytic reduction (SNCR)	NOx emissions 80 -180 mg/m^3 Lower energy consumption than SCR Lower costs than SCR	Relies on an optimum temperature around 900 °C, and sufficient retention time for reduction May lead to Ammonia slip	Port injection locations	All plant unless lower NOx release required for local environmental protection.
Reagent Type: Ammonia	Likely to be BAT	More difficult to handle Lower nitrous oxide formation Narrower temperature window		All plant
Reagent Type: Urea	Likely to be BAT	Higher N_2O emissions than ammonia, optimisation particularly important		All plant

The Applicant proposes to implement the following primary measures:

- Low NO_x burners – this technique reduces NO_x at source and is defined as BAT where auxiliary burners are required.
- Optimise primary and secondary air injection

There are three recognised techniques for secondary measures to reduce NO_x. These are Selective Catalytic Reduction (SCR), SCR by catalytic filter bags and Selective Non-Catalytic Reduction (SNCR) with or without catalytic filter bags. For each technique, there is a choice of urea or ammonia reagent.

SCR can reduce NO_x levels to below 50 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. The use of SCR by catalytic filter bags can reduce emissions to 50 -120 mg/m^3 with low investment costs. SNCR can typically reduce NO_x levels to between 80 and 180 mg/m^3, it relies on an optimum temperature of around 900 ^oC 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. Both reagents are BAT, and the use of one over the other is not normally significant in environmental terms.

Emissions of NO_x cannot be screened out as insignificant. Therefore, the Applicant has carried out a cost / benefit study of the alternative techniques. The cost per tonne of NO_x abated over the projected life of the plant has been calculated and compared with the environmental impact as shown in the table below.

	Cost of NO_x removal £/tonne	PC (long-term) µg/m^3	PEC (long-term)
SCR	1426	0.603	25.4
SNCR	4885	0.0221	25.22

Based on the figures above the Applicant considers that the additional cost of SCR over SNCR is not justified by the reduction in environmental impact. Thus SCR is not BAT in this case, and SNCR is BAT for the Installation.

The amount of ammonia used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH_3 slip. Improvement condition IC5 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system.

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	Large effluent disposal and water consumption if not fully treated for re-cycle		Used for wide range of waste types Can be used as

	Reagent delivery may be optimised by concentration and flow rate	Effluent treatment plant required May result in wet plume Energy required for effluent treatment and plume reheat		polishing step after other techniques where emissions are high or variable
Dry	Low water use Higher reagent consumption to achieve emissions of other FGC techniques but may be reduced by recycling in plant Lower energy use Higher reliability Lowest visible plume potential	Higher solid residue production Reagent consumption controlled only by input rate		All plant
Semi-dry (also described as semi-wet in the Bref)	Medium reaction rates Reagent delivery may be varied by concentration and input rate	Higher solid waste residues than wet but lower than dry system		All plant
Direct injection into boiler	Reduced acid loading to			Generally applicable to grate

	subsequent cleaning stages. Reduced peak emissions and reduced reagent usage			and rotary kiln plants.
Direction desulphurisation	Reduced boiler corrosion	Does not improve overall performance. Can affect bottom ash quality. Corrosion problems in flue gas cleaning system.		Partial abatement upstream of other techniques in fluidised beds
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	Efficient temperature range may be at upper end for use with bag filters	Not proven at large plant	CWIs

	Dry recycle 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 *gas in unavailable* 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 five recognised techniques for secondary measures to reduce acid gases, all of which can be BAT. These are wet, dry, semi-dry, boiler sorbent injection and direct desulphurisation. 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. Direct desulphurisation is only applicable for fluidised bed furnaces.

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

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

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

Direct boiler injection is applicable for all plants and can improve overall performance of the acid gas abatement system as well as reducing reagent usage.

In this case, the Applicant proposes to a use a dry system with lime. Lime is injected up stream of a reaction duct. The reaction duct is used to optimise the mass transfer between the flue gases and the dry absorbents. High turbulence is used to facilitate contact between the flue gases and the lime, thereby maximising pollutant removal. Unused lime is recycled. The Environment Agency is satisfied that this is BAT

6.2.4 Carbon monoxide and volatile organic compounds (VOCs)

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

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

6.2.5 Dioxins and furans (and Other POPs)

Dioxins and furans				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Optimise combustion control	All measures will increase oxidation of these species.		Covered in section on furnace selection	All plants
Avoid *de novo* synthesis			Covered in boiler design	All plant
Effective Particulate matter removal			Covered in section on particulate matter	All plant
Activated Carbon injection	Can be combined with acid gas absorber or fed separately. Metallic	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and

	mercury is also absorbed.			acid gas control also controls dioxin release.
Catalytic filter bags	High destruction efficiency	Does not remove mercury. Higher cost than non-catalytic filter bags		

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.
- Use of catalytic filter bags. These can achieve low levels of emissions but mercury is not removed.

In this case the Applicant proposes separate feed of activated carbon 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 recovery	Can be combined with acid gas absorber or fed separately. Can be impregnated with bromine	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

	or sulphur to enhance reactivity, for use during peak emissions.			dioxin release.
Fixed or moving bed adsorption	Mainly for mercury and other metals, as well as organic compounds			Limited applicability due to pressure drop
Boiler bromine injection	Injection during mercury peaks. Oxidation of mercury leading to improved removal in downstream removal method.	Consumption of aqueous bromine. Can lead to formation of polybrominated dioxins. Can damage bag filter. Effects can be limited use is restricted to dealing with peak emissions		Not suitable for pyrolysis or gasification. Can deal with mercury peaks.

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, mercury if present, will be in the vapour phase. BAT for mercury removal is one or a combination of the techniques listed above. The Applicant has proposed 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 Installation is not subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2012 therefore it is a requirement of IED to investigate how emissions of greenhouse gases emitted from the Installation might be prevented or minimised.

Factors influencing GWP and CO_2 emissions from the Installation are:
On the debit side

- CO_2 emissions from the burning of the waste;
- CO_2 emissions from burning auxiliary or supplementary fuels;
- CO_2 emissions associated with electrical energy used;
- N_2O from the de-NOx process.

On the credit side

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

The GWP of the plant will be dominated by the emissions of carbon dioxide that are released as a result of waste combustion. This will constant for all options considered in the BAT assessment. Any differences in the GWP of the options in the BAT appraisal will therefore arise from small differences in energy recovery and in the amount of N_2O emitted.

The Applicant considered energy efficiency and BAT for the de-NOx process in its BAT assessment. This is set out in sections 4.3.7, and 6.2.2 of this decision document.

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

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

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

6.4 BAT and POPs

International action on Persistent Organic pollutants (POPs) is required under the UN's Stockholm Convention, which entered into force in 2004. The EU implemented the Convention through the POPs Regulation (2019/1021), which is directly applicable in UK law. The Environment Agency is required by national POPs Regulations (SI 2007 No 3106) to give effect to Article 6(3) of the EC POPs Regulation when determining applications for environmental Permits.

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

The unintentionally-produced POPs addressed by the Convention are:
- dioxins and furans;
- HCB (hexachlorobenzene)
- PCBs (polychlorobiphenyls) and
- PeCB (pentachlorobenzene)

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

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

> "Member States shall, when considering proposals to construct new facilities or to significantly modify existing facilities using processes that release chemicals listed in Annex III , 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, without prejudice to Directive 2010/75/EU of the European Parliament and of the Council"

The 1998 Protocol to the Convention recommended that unintentionally produced POPs should be controlled by imposing emission limits (e.g 0.1 ng/m^3 for MWIs) and using BAT for incineration. UN Economic Commission for Europe (Executive Body for the Convention) (ECE-EB) produced BAT guidance for the parties to the Convention in 2009. This document considers various control techniques and concludes that primary measures involving management of feed material by reducing halogenated substances are not technically effective. This is not surprising because halogenated wastes still need to be disposed of and because POPs can be generated from relatively low concentrations of halogens. In summary, the successful control techniques for waste incinerators listed in the ECE-EB BAT are:

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

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

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

The release of **dioxins and furans** to air is required by the IED to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. The Permit requires that, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be monitored for 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. The Permit also requires monitoring of a range of PAHs and dioxin-like PCBs 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 as listed in the Permit. 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 5.2.1 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

There are no process-related releases from the Installation to surface water. All process water is recycled.

Surface water passes through oil separators and discharges into the site attenuation basin. Roof water discharges directly into the basin. The attenuation basin discharges into Holme Beck.

6.5.2 Emissions to sewer

Only domestic effluent will be discharged to foul 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 Applicant proposed the following key measures;

- The whole of the Installation's operational areas will be hard-surfaced
- All liquids used at the Installation will be provided with suitable secondary containment measures; all bunds will be served by blind collection points
- Suitable spill kits will be provided at strategic points to deal with minor spillages
- Bespoke drainage solutions for oil/chemical delivery and storage areas
- Automatic site shut-off valve to allow the site drainage to be isolated retaining water onsite within the attenuation pond and the underground systems in the event of a pollution incident
- The firewater will be temporarily stored and following testing, will be tankered off-site for disposal
- All incoming waste will be handled and stored internally
- Conveyors will be closed where necessary
- IBA stored inside
- APCr will be stored in silos kept at a slight negative pressure and will be equipped with particulate filters so that displaced air will not contain any entrained particulate matter

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

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

Waste accepted at the Installation will be delivered in covered vehicles or within containers and bulk storage of waste will only occur in the Installation's waste bunker. A roller shutter door will be used to close the entrance to the tipping hall outside of the waste delivery periods and combustion air will be drawn from the from the waste bunker. The negative air pressure will retain any odours in the building.

Improvement Condition (IC9) requires the Operator to demonstrate that negative pressure will be maintained by the system during commissioning.
IC
During shutdown, the waste bunker will be sealed. The reception of waste from delivery vehicles will take place in the waste transfer building, fitted with automatic fast acting doors to contain odours. Waste will be stored internally for a maximum of 72 hours.

Odour control sprays will be used in the tipping hall and waste transfer building.

6.5.5 Noise and vibration

The application contained a noise impact assessment which identified local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS 4142:2014 to compare the predicted plant rating noise levels with the established background levels.

Our assessment shows that there is the potential for an adverse impact at the nearest noise sensitive receptors during night-time weekend periods. Therefore we required the Applicant to submit a noise management plan.

An Improvement Condition (IC13) requires the Operator to carry out an operational noise assessment and an assessment of the effectiveness of control measures listed in the noise management plan, within 12 months of the completion of commissioning.

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

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.

BAT conclusions for waste incineration or co-incineration were published on 12/11/2019

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

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 location in assessing BAT. A lower limit of 3.5 mg/m^3 for NH_3 has been set. See section 5.4.4 for further information

(ii) National and European ESs

We are satisfied that the Installation will not result in an exceedance of any National or European ES.

(iii) Global Warming

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

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

(iv) Commissioning

Pre-operational condition PO4 will ensure that measures to protect the environment during commissioning are agreed with the Environment Agency.

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 establish data on the release of dioxin-like PCBs and PAHs from the incineration process 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 monitoring stack emissions guidance.

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 will provide back-up CEMS working in parallel to the operating CEMS. 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.

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

The BAT conclusions specify either manual extractive monitoring or long-term monitoring for dioxins. For mercury either continuous or long-term monitoring is specified, manual extractive monitoring is specified for other metals.

For dioxins long-term monitoring does not apply if emissions are stable, and for mercury long-term monitoring can be used instead of continuous if the mercury content of the waste is low and stable.

Based on the waste types and control measures proposed in the Application we expect that emissions of dioxins will be stable and that the mercury content of the waste will be low and stable. We have therefore set manual extractive monitoring in the Permit. However the Permit requires the stable and low criteria to be demonstrated through Improvement conditions IC10 and IC11 and we can require long-term monitoring for dioxins and continuous monitoring for mercury if required.

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 2016 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 2016 – 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 (now Directive 2011/92/EU) (the EIA Directive) applies, any relevant information obtained or conclusion arrived at pursuant to articles 5, 6 and 7 of that Directive shall be examined and used for the purposes of granting the permit."

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

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

In determining the Application we have considered the following documents:

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The decision of the Redcar and Cleveland Borough Council to grant planning permission on 24/07/20
- The report and decision notice of the local planning authority accompanying the grant of planning permission.
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

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

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 2016 – Waste Framework Directive

As the Installation involves the treatment of waste, it is carrying out a *waste operation* for the purposes of the EPR 2016, 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:

- the types and quantities of waste that may be treated;
- for each type of operation permitted, the technical and any other requirements relevant to the site concerned;
- the safety and precautionary measures to be taken;
- the method to be used for each type of operation;
- such monitoring and control operations as may be necessary;
- 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 2016 – Water Framework and Groundwater Directives

To the extent that it might lead to a discharge of pollutants to groundwater (a "groundwater activity" under the EPR 2016), 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 60 of the EPR 2016 requires the Environment Agency to prepare and publish a statement of its policies for complying with its public participation duties. We have published our public participation statement.

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

Our decision in this case has been reached following a programme of extended public consultation, on the original application. The way in which this has been done is set out in Section 2. A summary of the responses received to our consultations and our consideration of them is set out in Annex 4.

7.2 National primary legislation

7.2.1 Environment Act 1995

(i) Section 4 (Pursuit of Sustainable Development)

We are required to contribute towards achieving sustainable development, as considered appropriate by Ministers and set out in guidance issued to us. The Secretary of State for Environment, Food and Rural Affairs has issued *The Environment Agency's Objectives and Contribution to Sustainable Development: Statutory Guidance (December 2002)*. This document:

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

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

(ii) Section 5 (Preventing or Minimising Effects of Pollution of the Environment)

We are satisfied that our pollution control powers have been exercised for the purpose of preventing or minimising, remedying or mitigating the effects of pollution.

(iii) Section 6(1) (Conservation Duties with Regard to Water)

We have a duty to the extent we consider it desirable generally to promote the conservation and enhancement of the natural beauty and amenity of inland and coastal waters and the land associated with such waters, and the conservation of flora and fauna which are dependent on an aquatic environment.

We consider that no additional or different conditions are appropriate for this Permit.

(iv) Section 6(6) (Fisheries)

We have a duty to maintain, improve and develop fisheries of salmon, trout, eels, lampreys, smelt and freshwater fish.

We consider that no additional or different conditions are appropriate for this Permit.

(v) Section 7 (Pursuit of Conservation Objectives)

This places a duty on us, when considering any proposal relating to our functions, to have regard amongst other things to any effect which the proposals would have on sites of archaeological, architectural, or historic interest; the economic and social well-being of local communities in rural areas; and to take into account any effect which the proposals would have on the beauty or amenity of any rural area.

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.

(vi) Section 39 (Costs and Benefits)

We have a duty to take into account the likely costs and benefits of our decisions on the applications ('costs' being defined as including costs to the environment as well as any person). This duty, however, does not affect our obligation to discharge any duties imposed upon us in other legislative provisions.

In so far as relevant we consider that the costs that the permit may impose on the Applicant are reasonable and proportionate in terms of the benefits it provides.

(vii) 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.

We have also had regard to the clean air strategy 2019 and consider that our decision complies with the Strategy, and that no additional or different conditions are appropriate for this Permit.

(viii) National Emissions Ceiling Regulations 2018

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

7.2.2 Section 108 Deregulation Act 2015 – Growth duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.

Paragraph 1.3 of the guidance says:

> *"The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation."*

We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution.

This also promotes growth amongst legitimate Operators because the standards applied to the Operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

7.2.3 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.

7.2.4 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.

7.2.5 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.

7.2.6 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.

7.2.7 Countryside Act 1968

Section 11 imposes a duty on the Environment Agency to exercise its functions relating to any land, having regard to the desirability of conserving the natural beauty and amenity of the countryside including wildlife. We have done so and consider that no different or additional conditions in the Permit are required.

7.2.8 National Parks and Access to the Countryside Act 1949

Section 11A and section 5(1) imposes a duty on the Environment Agency when exercising its functions in relation to land in a National Park, to have regard to the purposes of conserving and enhancing the natural beauty, wildlife and cultural heritage of the areas, and of promoting opportunities for the understanding and enjoyment of National Parks by the public.

There is no National Park which could be affected by the Installation.

7.3 National secondary legislation

7.3.1 Conservation of Habitats and Species Regulations 2017

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

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

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

7.3.2 Water Environment (Water Framework Directive) Regulations 2017 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 compliance with the requirements of the Water Framework Directive, Groundwater directive and the EQS Directive through (inter alia) environmental permits, and its obligation in regulation 33 to have regard to the river basin management plan (RBMP) approved under regulation 31 and any supplementary plans prepared under regulation 32. However, it is felt that

existing conditions are sufficient in this regard and no other appropriate requirements have been identified.

We are satisfied that granting this application with the conditions proposed would not cause the current status of the water body to deteriorate.

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 them with information, consulting them or involving them in any other way. S24 requires us to have regard to any Secretary of State guidance as to how we should do that.

The way in which the Environment Agency has consulted with the public and other interested parties is set out in section 2 of this document. The way in which we have taken account of the representations we have received is set out in Annex 4. Our public consultation duties are also set out in the EP Regulations, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS6 and the Environment Agency's Building Trust with Communities toolkit.

ANNEX 1A: 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 2.3.4(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 2.3.4(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.	Conditions 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.	Not Applicable
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 3.6.1 to 3.6.54 and Tables S3.1, S3.1(a), S3.2 and S3.3 in Schedule 3 of the Permit.
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.	Condition 2.3.12
45(2)(a)	The permit shall include a list of the quantities of the different categories of hazardous waste which may be treated.	Not Applicable
45(2)(b)	The permit shall include the minimum and maximum mass flows of those hazardous waste, their lowest and maximum calorific	Not Applicable

IED Article	Requirement	Delivered by
	values and the maximum contents of polychlorinated biphenyls, pentachlorophenol, chlorine, fluorine, sulphur, heavy metals and other polluting substances.	
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Condition 2.3.1 and Table S1.2 of Schedule 1 of the Permit.
46(2)	Emission into air shall not exceed the emission limit values set out in part 3 of Annex VI.	Conditions 3.1.1 and 3.1.2 and Tables S3.1, S3.1a.
46(3)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(4)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(5)	Prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. Adequate storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting.	The application explains the measures to be in place for achieving the directive requirements. The permit requires that these measures are used. Various permit conditions address this and when taken as a whole they ensure compliance with this requirement.
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/m^3), CO and TOC not to be exceeded during this period.	Conditions 2.3.9 and 2.3.13

IED Article	Requirement	Delivered by
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m^3), CO and TOC not to be exceeded during this period.	Condition 2.3.9 to 2.3.13
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.6.1 to 3.6.4, 3.2.1, 3.2.2, tables S3.1, S3.1(a). Reference conditions are defined in Schedule 6 of the Permit.
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.	Conditions 3.6.1, 3.6.3, table S3.1and S3.1(a).
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Conditions 3.6.1. Improvement Condition IC 12 and Pre-operational condition PO8
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Conditions 4.1.1 and 4.1.2, and Tables S4.1 and S4.4
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 3.1.1, 3.1.2, 3.2.1, 3.2.2 and tables S3.1, S3.1(a)
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3%.	Conditions 3.6.1 and Table S3.4
50(2)	Flue gas to be raised to a temperature of 859ºC for two seconds, as measured at representative point of the combustion chamber.	Condition 2.3.8, Pre-operational condition PO6 and Improvement condition IC4 and Table S3.4
50(3)	At least one auxiliary burner which must not be fed with fuels which	Condition 2.3.14

IED Article	Requirement	Delivered by
	can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	
50(4)(a)	Automatic shut-down to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.9
50(4)(b)	Automatic shut-down to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.9
50(4)(c)	Automatic shut-down to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.9 and 2.3.13
50(5)	Any heat generated from the process shall be recovered as far as practicable.	(a) The plant will generate electricity (b)Operator to review the available heat recovery every 2 years (Conditions 1.2. 1 to 1.2.3)
50(6)	Relates to the feeding of infectious clinical waste into the furnace.	No infectious clinical waste will be burnt
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit.
51(1)	Different conditions than those laid down in Article 50(1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are me.	No such conditions Have been allowed
51(2)	Changes in operating conditions do not cause more residues or residues with a higher content of organic polluting substances compared to those residues which could be expected under the conditions laid down in Articles 50(1), (2) and (3).	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
52(1)	Take all necessary precautions concerning delivery and reception of	Conditions 2.3.1, 2.3.3, 3.3, 3.4, 3.5 and 3.7

IED Article	Requirement	Delivered by
	Wastes, to prevent or minimise pollution.	
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Condition 2.3.4(a) and Table S2.2 in Schedule 3 of the Permit.
52(3)	Prior to accepting hazardous waste, the Operator shall collect available information about the waste for the purpose of compliance with the permit requirements specified in Article 45(2).	Not Applicable
52(4)	Prior to accepting hazardous waste, the Operator shall carry out the procedures set out in Article 52(4).	Not Applicable
52(5)	Granting of exemptions from Article 52(2), (3) and (4).	Not Applicable
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Condition 3.6.1 with Table S3.4
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	conditions 1.4.1 2.3.1, 2.3.2 and 3.3.1.
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.6.1 and Table S3.4 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 1B: Compliance with BAT conclusions

BAT conclusion	Criteria	Delivered by
1	Implement environmental management system	Condition 1.1 and Pre-operational condition PO1
2	Determine gross electrical efficiency	Section 4.3.7 of this decision document. Permit table S3.3
3	Monitor key process parameters	Condition 3.5.1 and table S3.3
4	Monitoring emissions to air	Condition 3.5.1 and table S3.1
5	Monitoring emissions to air during OTNOC	Condition 1.1.1 and pre-operational condition PO1
6	Monitor unburnt substances in slags and bottom ashes	Conditions 3.1.5 and 3.5.1, and table S3.3
7	Waste stream management techniques	The Application explains the measures that will be used. Permit condition 2.3.1, table S1.2
8	Monitor waste deliveries as part of waste acceptance procedures	The Application explains the measures that will be used. Permit condition 2.3.1, table S1.2
9	Reception, handling and storage of waste	Measures are described in the Application and provisional FPP. Permit conditions 2.3.1, table S1.2 and pre-operational condition P05.
14	Improve overall performance of plant including BAT-AELs for TOC or LOI	Techniques described in the Application. Permit condition 2.3.1, table S1.2, 3.1.5, 3.5.1 and table S3.3
15	Procedures to adjust plant settings to control performance	Measures described in the Application condition 2.3.1 and table S1.2
16	Procedures to minimise start-up and shut down	Measures described in the Application and condition 2.3.1

BAT conclusion	Criteria	Delivered by
17	Appropriate design, operation and maintenance of FGC system	FGC measures described in Application. Operation and maintenance procedures will form part of the EMS
18	OTNOC management plan	Pre-operational condition PO1
19	Use of heat recovery boiler	Described in the Application. Permit condition 2.3.1, table S1.2
20	Measures to increase energy efficiency and BAT AEEL	Measures described in the Application. Permit condition 2.3.1, table S1.2 Section 4.3.7 of this decision document.
21	Measures to prevent or reduce diffuse emissions including odour	Measures described in the Application. Permit conditions 2.3.1, table S1.2, 3.4.1, 3.3.1, 3.3.2. Sections 4.2.2, 6.5.3 and 6.5.4 of this decision document.
22	Handling of gaseous and liquid wastes	Not applicable
23	Management system to prevent or reduce dust emissions from treatment of slags and ashes	Not applicable
24	Techniques to prevent or reduce diffuse emissions to air from treatment of slags and ashes	Not applicable
25	Minimisation of dust and metal emissions and compliance with BAT AEL	Section 5.2 of this decision document. Permit conditions 2.3.1, table S1.2, 3.4.1, 3.3.1, 3.3.2. 3.1.1 and 3.1.2 and table S3.1
26	Techniques and BAT AEL for dust emissions from enclosed slags and ashes treatment	Not applicable
27	Techniques to reduce emissions of HCl, HF and SO_2	Measures described in the Application. Permit condition 2.3.1 and table S1.2 Permit condition 2.3.1 and table S1.2 Section 5.2 of this decision document.

BAT conclusion	Criteria	Delivered by
28	Techniques to reduce peak emissions of HCl, HF and SO_2, optimise reagent use and BAT AELs	Measures described in the Application. Permit conditions 2.3.1, table S1.2, 3.1.1 and 3.1.2 and table S3.1
29	Techniques to reduce emissions of NO_2, N_2O, CO and NH_3 and BAT AELs	Measures described in the Application. Section 5.2 of this decision document. Permit conditions 2.3.1, table S1.2, 3.1.1 and 3.1.2 and table S3.1
30	Reduce emissions or organic compounds including dioxins/furans and PCBs. BAT AELs	Measures described in the Application. Section 5.2 of this decision document. Permit conditions 2.3.1, table S1.2, 3.1.1 and 3.1.2 and table S3.1
31	Reduce emissions of mercury. BAT AEL	Measures described in the Application. Section 5.2 of this decision document. Permit conditions 2.3.1, table S1.22.3.1, table S1.2, 3.1.1 and 3.1.2 and table S3.1
32	Segregate waste water streams to prevent contamination	Measures described in the Application Sections 4.2.2, 6.5.1 and 6.5.3 of this decision document. Permit conditions 2.3.1, table S1.23.1.1, 3.1.2 and table S3.4
33	Techniques to reduce water usage and prevent or reduce waste water	Measures described in the Application. Sections 4.2.2 and 4.3.8 of this decision document Permit conditions 1.3.1, 2.3.1, table S1.2
34	Reduce emissions to water from FGC and/or from treatment or storage of bottom ashes. BAT AELs	Not applicable
35	Handle and treat bottom ashes separately from FGC residues	Permit condition 2.3.15

BAT conclusion	Criteria	Delivered by
36	Techniques for treatment of slags and bottom ashes	No treatment carried out on site
37	Techniques to prevent or reduce noise emissions.	Measures are described in the Application. Section 6.5.5 of this decision document. Permit conditions 2.3.1, table S1.2, 3.5.1, 3.5.2

ANNEX 2: Pre-Operational Conditions

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

Table S1.4A Pre-operational measures	
Reference	**Pre-operational measures**
PO1	Prior to the commencement of commissioning, the Operator shall send a summary of the site Environment Management System (EMS) to the Environment Agency and obtain the Environment Agency's written approval to the EMS summary. The summary shall include a copy of the full other than normal operating conditions (OTNOC) management plan which shall be prepared in accordance with BAT 18 of the BAT conclusions and include: • a list of potential OTNOC situations that are considered to be abnormal operation under the definition in Schedule 6 of this permit. • a definition of start-up and shut-down conditions having regard to any Environment Agency guidance on start-up and shut-down. • any updates on the design of critical equipment to minimise OTNOC since the permit application The Operator shall 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 Environment Agency web guide on developing a management system for environmental permits (found on www.gov.uk) and BAT 1 of the incineration BAT conclusions. The EMS shall include the approved OTNOC management plan. 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	At least 3 months before the commencement of commissioning the operator shall submit a written Fire Prevention Plan to the Environment Agency for assessment and written approval. • The plan must follow Environment Agency Fire prevention plan guidance. You must implement the proposals in the plan as agreed with the Environment Agency.
PO3	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency, and obtain the Environment Agency's written approval to it, a protocol for the sampling and testing of incinerator bottom ash for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.
PO4	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency, and obtain the Environment Agency's written approval to it, 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.

Table S1.4A Pre-operational measures	
Reference	**Pre-operational measures**
PO6	No later than one month after the final design of the furnace and combustion chamber, the operator shall submit a written report to the Environment Agency, and obtain the Environment Agency's written approval to it, of the details of the computational fluid dynamic (CFD) modelling. The report shall explain how the furnace has been designed to comply with the residence time and temperature requirements as defined by Chapter IV and Annex VI of the IED whilst operating under normal load and the most unfavourable operating conditions (including minimum turn down and overload conditions), and that the design includes sufficient monitoring ports to support subsequent validation of these requirements during commissioning.
PO7	At least 6 month prior to the commencement of commissioning, the Operator shall submit an updated report, and obtain the Environment Agency's written approval to it, on the baseline conditions of soil and groundwater at the installation. The report shall contain the information necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities provided for in Article 22(3) of the IED. The report shall contain all information, needed to meet the information requirements of the H5 Site Condition Report Guidance, and Article 22(2) of the IED including European Commission Guidance Note Concerning Baseline Reports under Article 22(2) (2014/C136/03).
PO8	At least three months before (or other date agreed in writing with the Environment Agency) the commencement of commissioning, the Operator shall submit a written report to the Environment Agency, and obtain the Environment Agency's written approval to it, specifying arrangements for continuous and periodic monitoring of emissions to air to comply with Environment Agency guidance notes 'Monitoring stack emissions: techniques and standards for periodic monitoring' and M20. • Plant and equipment details, including accreditation to MCERTS • Methods and standards for sampling and analysis • Details of monitoring locations, access and working platforms
PO9	At least 3 months before the commencement of commissioning (or other date agreed in writing with the Environment Agency) the Operator shall submit, for approval by the Environment Agency, a methodology (having regard to Technical Report P4-100/TR Part 2 Validation of Combustion Conditions) to verify the residence time, minimum temperature and oxygen content of the gases in the furnace whilst operating under normal load, minimum turn down and overload conditions.

ANNEX 3: Improvement Conditions

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

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC1	The Operator shall submit a written report to the Environment Agency on the implementation of its Environmental Management System (EMS) and the progress made in the certification of the system by an external body or if appropriate submit a schedule by which the EMS will be certified.	Within 12 months of the completion of commissioning.
IC2	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1 and A2, identifying the fractions within the PM_{10}, and $PM_{2.5}$ ranges. On receipt of written approval from 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 and confirm that the Environmental Management System (EMS) has been updated accordingly.	Within 4 months of the completion of commissioning.
IC4	The Operator shall notify the Environment Agency of the proposed date(s) that validation testing is planned for.	Notification at least 3 weeks prior to validation testing
	During commissioning the Operator shall carry out validation testing to validate the residence time, minimum temperature and oxygen content of the gases in the furnace whilst operating under normal load and most unfavourable operating conditions. The validation shall be to the methodology as approved through pre-operational condition PO9.	Validation tests completed before the end of commissioning
	The Operator shall submit a written report to the Environment Agency on the validation of residence time, oxygen and temperature whilst operating under normal load, minimum turn down and overload conditions.	Report submitted within 2 months of the completion of commissioning.

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	The report shall identify the process controls used to ensure residence time and temperature requirements are complied with during operation of the incineration plant	
IC5	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of: • The lime injection system for minimisation of acid gas emissions • The carbon injection system for minimisation of dioxin and heavy metal emissions. • The Selective Non Catalytic Reduction (SNCR) system and combustion settings to minimise oxides of nitrogen (NOx). The report shall include an initial assessment of the level of NOx, N_2O and NH_3 emissions that can be achieved under optimum operating conditions.	Within 4 months of the completion of commissioning.
IC6	The Operator shall carry out an assessment of the impact of emissions to air of the component metals subject to emission limit values: As and Cr (VI) A report on the assessment shall be made to the Environment Agency. Emissions monitoring data obtained during the first year of operation shall be used to compare the actual emissions with those assumed in the impact assessment submitted with the Application. An assessment shall be made of the impact of each metal against the relevant ES. In the event that the assessment shows that an environmental standard can be exceeded, the report shall include proposals for further investigative work.	15 months from the completion of commissioning
IC7	The Operator shall submit a written summary report to the Environment Agency to confirm 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. The report shall include the results of calibration and verification testing,	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 completion of commissioning.

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
IC8	The Operator shall submit to the Environment Agency for approval a plan for implementing the CHP scheme identified in the cost benefit analysis (dated 24 November 2023) The plan shall include as a minimum: • A timescale for implementation • A description of any dependencies or further approvals required • A description of any changes that will need to be made to the plant • Whether there will be any operational changes which could affect the environmental impact of the Installation [such as a reduction in stack temperature • Consideration of whether a permit variation will be required If required to do so by the Environment Agency they shall implement the plan in accordance with the Environment Agency's written approval.	Within 6 months of completion of commissioning or as agreed in writing with the Environment Agency
IC9	During commissioning, the Operator shall carry out tests to demonstrate whether the furnace combustion air will ensure that negative pressure is achieved throughout the reception hall. The tests shall demonstrate whether air is pulled through the reception hall and bunker area and into the furnace with dead spots minimised. The Operator shall submit a report to the Environment Agency, for approval, summarising the findings along with any proposed improvements if required	Within 6 months of completion of commissioning.
IC10	The Operator shall carry out a programme of dioxin and dioxin like PCB monitoring over a period and frequency agreed with the Environment Agency. The Operator shall submit a report to the Environment Agency with an analysis of whether dioxin emissions can be considered to be stable.	Within 6 months of completion of commissioning or as agreed in writing with the Environment Agency
IC11	The Operator shall carry out a programme of mercury monitoring over a period and frequency agreed with the Environment Agency. The Operator shall submit a report to the Environment Agency with an analysis of whether the waste feed to the plant can be proven to have a low and stable mercury content.	Within 6 months of completion of commissioning or as agreed in writing with the Environment Agency
IC12	During commissioning, the operator shall carry out tests to assess whether the air monitoring location(s) meet the requirements of BS EN 15259 and supporting Method Implementation Document (MID). A written report shall be submitted for approval setting out the results and conclusions of the assessment including where necessary proposals for improvements to meet the requirements. The report	Report to be submitted to the Agency within 3 months of completion of commissioning.

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	shall specify the design of the ports for PM10 and PM2.5 sampling. Where notified in writing by the Environment Agency that the requirements are not met, the operator shall submit proposals or further proposals for rectifying this in accordance with the time scale in the notification. The proposals shall be implemented in accordance with the Environment Agency's written approval.	
IC13	The Operator shall submit a written proposal to the Environment Agency for approval to carry out a review of the noise impact of the installation at the most sensitive receptors once the facility is fully operational in its first year of operation. The proposal shall include as a minimum a review of the appropriate measurements to verify any modelling work to establish whether any noise emissions are likely to give rise to nuisance or complaints and an action plan to be developed and agreed if significant adverse impacts are identified.	Within 6 months of completion of commissioning or as agreed in writing with the Environment Agency.
	The Operator shall submit a written report to the Environment Agency for approval on the findings of the review of noise impacts, including an action plan to address any significant adverse impacts where they are identified.	Report to be submitted to the Environment Agency within 12 months of 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 decision is summarised in this Annex. Copies of all consultation responses have been placed on the Environment Agency public register.

The Application was advertised on the Environment Agency website from 27/01/23 to 10/03/23. The application was made available to view on-line. From the responses received, the application was re-considered to be HPI.

The application was therefore re-advertised on the Environment Agency website from 19/09/23 to 31/10/23 and advertised on the Teesside Gazette on 19/09/23. The application was made available to view on-line.

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

- UK Health Security Agency (UKHSA)
- Food Standards Agency
- Darlington, Durham, Hartlepool, Middlesbrough, Newcastle, Redcar and Stockton borough councils
- Health and safety Executive
- Cleveland Fire Brigade

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from UK Health Security Agency	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
No separate dust or odour management plan were included with the application documents, and consequently no dust and odour monitoring, or complaints procedures were detailed in the application. Therefore, it is recommended that the Applicant provides details regarding a dust and odour monitoring plan as well as a complaints procedure for the site.	We checked the Applicants dust and odour risk assessment and we are satisfied the risk of fugitive dust and odour from the site are low. We are satisfied that no routine fugitive dust and odour monitoring is required. The Applicant has listed procedures to deal with complaints made in the application
UKHSA support approaches to minimise exposure to non-threshold pollutants.	No action required.

Response Received from Hartlepool Borough Council on behalf of the 7 Councils in the north-east	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
In principle the Councils support applications, made by bidders, which enable the development of the Installation.	No action required.

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

The consultation responses received were wide ranging and a number of the issues raised were outside the Environment Agency's remit in reaching its permitting decisions. Specifically, questions were raised which fall within the jurisdiction of the planning system, both on the development of planning policy and the grant of planning permission.

Guidance on the interaction between planning and pollution control is given in the National Planning Policy Framework. It says that the planning and pollution control systems are separate but complementary. We are only able to take into account those issues, which fall within the scope of the Environmental Permitting Regulations.

a) Representations from local Councillors

Representations were received from a local councillor.

Brief summary of issues raised:	Summary of action taken / how this has been covered
Comments about the application	
Supports the application	No action required

b) Representations from Community and Other Organisations

Representations were received from Stop Incineration North East, Climate Action Newcastle and United Kingdom Without Incineration.

Brief summary of issues raised:	Summary of action taken / how this has been covered
Comments about the application	

Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern that the application was not considered High Public Interest.	In response to comments received during the first consultation, the application was re-considered to be a High Public Interest application. The application was subsequently advertised in the Teesside Gazette and re-advertised on Citizen Space for a further 6 weeks. Annex 4 Section A of this decision document has further details
Concern the capacity has increased from 450,000 tonnes per annum to 512,000 tonnes per annum.	The EPR application is based on 450, 000 tonnes per annum. The permit, Table S2.2, restricts the site to 450,000 tonnes per annum. Section 4.3.6 of this decision document has further details
Comments about operation and regulation of the Installation	
Concern over the operation of the Installation.	We are satisfied that the Applicant will be a competent Operator because: • An EMS certified to ISO 14001 will be in place • A suitably qualified facility manager will be appointed who will have responsibility for Permit compliance • An environmental policy will require that the Installation operates in full compliance with legislative requirements Section 4.3 of this decision document has further details

Brief summary of issues raised:	Summary of action taken / how this has been covered
Comments about the regulation of the Installation's emissions monitoring.	We will regulate the site carrying out a continual assessment of plant operations and its environmental performance. This will be achieved in the following ways; The permit requires the Operator to monitor emissions and report the results to us. We will regularly inspect the Installation (both announced and unannounced as a frequency that we consider appropriate), review monitoring techniques and assess monitoring results. We will carry out on-site audits of Operator monitoring. The permit requires the Operator to inform us, in writing, within 24 hours of any breach of the emission limits, followed by a fuller report of the size of the release, its impact and how they propose to avoid this happening in the future. The Operator's monitoring results are placed on the public registers. Depending on the seriousness of any breach, we will take appropriate enforcement action.

Brief summary of issues raised:	Summary of action taken / how this has been covered
Comments about independent checks of emissions monitoring	The Environment Agency used to carry out check-monitoring when there were relatively few standards for monitoring. Check monitoring is no longer as important because: • There is now a wide variety of standards for monitoring, covering CEMs, periodic monitoring, and quality assurance • We require CEMS to be MCERTS certified • We require EN 14181 for quality assurance of CEMs • We require test labs to be accredited to MCERTS for all the applicable standards • We carry out audits of Operators' provisions for monitoring and audit the monitoring results We can still do check monitoring where it is considered appropriate. Furthermore, as well as auditing Operators' provisions for monitoring, and how they apply the monitoring requirements of the permit, we also audit laboratories doing the testing.

Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern that no odour, dust, noise and pest management plans are required.	We have reviewed the Applicant's risk assessment and are satisfied that no dust, odour and pest management plans are required. Sections 6.5.3 and 6.5.4 of this decision document has further details We reviewed the Applicant's noise impact assessment and required further monitoring work and the production of a noise management plan. The noise management plan is included within the operating techniques in Table S1.2 of the permit. Section 6.5.5 of this decision document has further details
Comments that recycling is a better option compared to incineration	The proposed facility forms part of an integrated waste management strategy; any material arriving at the facility will be residual waste arisings following upstream waste segregation, recovery and recycling initiatives. The shape and content of this strategy is a matter for the local authority. The incinerator is one element in that strategy, and the permit will ensure that it can be operated without giving rise to significant pollution or harm to human health. In any event permit conditions prohibit the burning of any separately collected or recovered waste streams, unless contaminated and recovery is not practicable.
Comments about air emissions, modelling and air risk assessments	
Concern over the impact of fine particulate and ultra fine particulate matter.	We are satisfied that there will not be a significant impact from ultra fine particles. Section 5.3.3 of this decision document has further details.
Concern over adequacy of the proposed stack height with regard to adequate dispersion	We are satisfied that the stack height has been calculated in accordance with IED article 46(1).

Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern over the impact of emissions on air quality.	We are satisfied that there will not be a significant impact on air quality due to the Installation. Section 5.2 of this decision document has further details.
References to Plume Plotter website	Plume Plotter is a tool which uses air quality modelling software to predict the ground level concentrations of nitrogen oxides and other pollutants that may arise from the incinerator based on a number of factors. The information on the website indicates that the results may be based on expected modelling methods. However, there is no information on the website as to how the model was validated and we have not seen the model input parameters, and so cannot comment on the validity of the predictions. We have audited the dispersion modelling submitted with this application and we are satisfied that there will not be any significant impacts. Sections 5.1 and 5.2 of this decision document has further details
Concern that local weather patterns have not been fully considered	We checked the weather data used by the Applicant when we assessed the Applicant's dispersion modelling. We are satisfied with the weather data that was used. Section 5.2 of this decision document has further details.
Comments about health impacts	
Concern over the health impacts from emissions.	We are satisfied that there will not be a significant impact on health due to the Installation. Section 5.3 of this decision document has further details.
Comments about impacts on land and water	

Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern over discharges to Holme Brook	We asked the Applicant to provide alternative plans, to discharging domestic effluent to Holme Brook. The revised plans, include a connection to foul sewer. Only uncontaminated roof and surface water will be released to Holme Brook. Measures will be in place to prevent fugitive emissions to water. Sections 6.5.1 and 6.6.2 of this decision document have further details.
Concern over the groundwater and soil monitoring frequency.	The permit (condition 3.3.4) requires a minimum sampling frequency of 5 years for groundwater and 10 years for soil. Before the Installation is operated, pre-operational condition PO 07, in the permit, requires a site condition report to be submitted, establishing baseline conditions of the soil and groundwater. A pre-operational condition has been set, because the plot of land has not been fully developed, enabling a representative baseline assessment. For the permit to be surrendered the Operator must show the site poses no risk to soil or groundwater. Section 4.2.2 of this decision document has further details. We are satisfied with the minimum sampling frequency.
Comments about Heavy Goods Vehicles (HGVs)	

Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern over noise from HGVs on and off-site	The environmental impact of HGVs off the site are not regulated under EPR. Noise from HGVs is included in the noise management plan. We are satisfied there will not be a significant impact of noise from HGVs. Section 6.5.5 of this decision document has further details.
Concern over odour from HGVs on and off-site	The environmental impact of HGVs off the site are not regulated under EPR. Waste accepted at the Installation will be delivered in covered vehicles or within containers. We are satisfied there will not be a significant impact from odour. Section 4.1.3 of this decision document has further details.
Comments about impacts at ecological sites	
Concern over the impact at habitat sites and other ecological sites (including '*over-fertilisation*')	Our assessment at ecological sites is described in section 5.4 of this decision document. We have set a lower emission limit of 3.5 mg/m^3 for ammonia, to reduce nutrient nitrogen deposition. We are satisfied that there will not be a significant impact and Natural England agreed with our assessment. See section 5.4.4 of this decision document.
Comments about BAT and control measures	

Brief summary of issues raised:	Summary of action taken / how this has been covered
References to SCR should be used rather than SNCR	There are three recognised techniques for secondary measures to reduce NO_x. These are Selective Catalytic Reduction (SCR), SCR by catalytic filter bags and Selective Non-Catalytic Reduction (SNCR) with or without catalytic filter bags. 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. Section 6.2.2 of this decision document has further details.
Comments about other issues	
Concerns about the testing and the non-hazardous waste classification of IBA	To ensure that the IBA residues are adequately characterised, pre-operational condition PO3 requires the Operator to provide a written plan for approval, detailing ash sampling protocols. Table S3.5 requires the Operator to carry out an ongoing programme of monitoring. Section 4.3.9 of this decision document has further details.

c) Representations from Individual Members of the Public

A total of 73 responses were received from individual members of the public. Many of the issues raised were the same as those considered above. Only those issues additional to those already considered are listed below:

Brief summary of issues raised:	Environment Agency comment
Comments about CO_2 and climate change	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. We agree with the Operator's assessment and that the chosen options are BAT for the Installation.

	Section 6.3 of this decision document has further details.
Concern that more investigations into health impacts should be carried out.	The Environment Agency takes advice from UKHSA (formally PHE) on the health implications of incinerators generally and specifically on each application for a permit. In January 2012 PHE confirmed they would be undertaking a study to look for evidence of any link between municipal waste incinerators and health outcomes including low birth weight, still births and infant deaths. The study has been undertaken to extend the evidence base and provide the public with further information; as such it does not justify a delay in our decision making on permit applications. The first part of the study was published on 31st October 2018. The study found that living near an incinerator and being exposed to emissions from an incinerator were not associated with additional risk of any of the birth outcomes investigated. UKHSA's current position remains that modern, well run municipal waste incinerators are not a significant risk to public health. Section 5.3.1 of this decision document has further details.
Concerns about the impact on local allotments and grown food	The human health risk assessment calculates the dose of dioxins and furans that would be received by local receptors if their food and water were sourced from the locality where the deposition of dioxins, furans and dioxin like PCBs is predicted to be the highest.

	The results showed that the predicted daily intake of dioxins, furans and dioxin like PCBs at all receptors, resulting from emissions from the proposed facility, were significantly below the recommended Tolerable Daily Intake (TDI) levels. Section 5.3.2 of this decision document has further details.
Concerns about pollution to groundwater caused by landfilling waste from the incinerator	Incinerator bottom ash will normally be recycled. Air pollution control residues will be landfilled or sent to a waste treatment facility. If either of these waste streams are landfilled, the landfill must be permitted to accept the specific type of waste. Controls must also be in place to prevent ground water pollution. Section 4.3.9 of this decision document has further details.
Concern that recyclable waste will be incinerated	The obligation is on waste producers is to apply the waste hierarchy and for local authorities to have their own waste strategy dealing with kerbside collections. Our role in this determination is to assess whether any residual waste that may be sent for incineration can be dealt with in an environmentally acceptable manner. In addition to this we have set permit conditions 2.3.5 and 2.3.6 that does not allow separately collected fractions to be incinerated unless they are unsuitable for recycling.

d) Representations on issues that do not fall within the scope of this permit determination

Brief summary of issues raised:	Environment Agency comment
Concerns over the location of the incinerator	Decisions over land use are matters for the planning system. The location of the Installation is a relevant consideration for Environmental Permitting, but only in so far as its potential to have an adverse environmental impact on communities or sensitive environmental receptors. The environmental impact is assessed as part of the determination process and has been reported upon in the main body of this document. The location of the Installation can have an impact on the ability to recover waste heat for use in nearby residential, commercial or industrial premises and we commented on this in our consultation response to the local planning authority.
Concern over increased traffic on the local roads.	These are relevant considerations for the grant of planning permission, but do not form part of the Environmental Permit decision making process.
Concern that the incinerator is not necessary as there is adequate existing capacity to dispose of non-recyclable waste.	Need and waste management strategy are matters for the relevant local authority. Our role is to determine whether the facility can be operated without giving rise to significant pollution of the environment or harm to human health.
Concerns the site may flood	The Environment Agency provides advice and guidance to the local planning authority on flood risk in our consultation response to the local planning authority. Our advice on these matters is normally accepted by both Applicant and Planning Authority.

	When making permitting decisions, flood risk is still a relevant consideration, but generally only in so far as it is taken into account in the accident management plan and that appropriate measures are in place to prevent pollution in the event of a credible flooding incident. The site is located in Flood Zone 1. Areas within Flood Zone 1 are deemed to have less than a 1 in 1000 (0.1%) annual probability of flooding in any given year. Flood Zone 1 is the lowest risk flood zone.
Concerns that waste should be recycled and not incinerated	The obligation is on waste producers is to apply the waste hierarchy and for local authorities to have their own waste strategy dealing with kerbside collections. Our role in this determination is to assess whether any residual waste that may be sent for incineration can be dealt with in an environmentally acceptable manner. In addition to this we have set permit condition 2.3.4 (c) that does not allow separately collected fractions to be incinerated unless they are unsuitable for recycling.
Comments that waste is not renewable and not low carbon	Only the energy generated from the recently grown materials in the mixture is considered renewable. Energy from residual waste is therefore a partially renewable energy source, sometimes referred to as a low carbon energy source.
Concern the Installation is not carbon capture ready.	The Installation is not required to be carbon capture ready and this does not form part of this permit determination. The application does describe areas set aside for future carbon capture and storage plant.

Comments about incineration over capacity in England	Under the EPR, we are not responsible for deciding whether an EfW plant is the right solution for managing residual waste in the area, or whether it is too big for local needs. We have no powers to refuse a new permit or variation application on capacity grounds. This also means we are unable to take into account any comments from consultees on these subjects.
Concerns about light pollution	Pollution from light is primarily a concern for considering visual impacts and as such covered by the planning process.
Comments relating to pollution caused by the Byker incinerator	The Byker incinerator was built in the 1970s. Ash from the incinerator was spread on allotments. Ash from this Installation must be recycled or disposed of by sites holding a suitable permit.