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

Decision document recording our decision-making process

The Permit Number is:	EPR/WP3833FT
The Applicant / Operator is:	MVV Environment Devonport Limited
The Installation is located at:	Devonport Energy from Waste CHP North Yard, Devonport Dockyard, Plymouth, PL5

What this document is about

This is a decision document, which accompanies a permit.

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

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/WP3833FT/A001. We refer to the application as "the **Application**" in this document in order to be consistent. The permit reference number is EPR/WP3833FT. We refer to the proposed permit as "the **Permit**" in this document. The Application was duly made on 7 June 2011.

The Applicant is MVV Environment Devonport Limited. We refer to MVV Environment Devonport Limited as "the **Applicant**" in this document. Where we are talking about what will happen after the Permit is granted, we call MVV Environment Devonport Limited "the **Operator**".

MVV Environment Devonport Limited's proposed facility is located at the North Yard of Devonport Dockyard in Plymouth. We refer to this as "the **Installation**" in this document.

How this document is structured

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

Glossary of acronyms used in this document

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

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

IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC)
I-TEF	Toxic Equivalent Factors set out in Annex I of WID
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCPD	Large Combustion Plant Directive (2001/80/EC)
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NO_x	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
Opra	Operator Performance Risk Appraisal
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PCT	Primary Care Trust
PEC	Predicted Environmental Concentration
POP(s)	Persistent organic pollutant(s)
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated byphenyls
PXDF	Poly-halogenated di-benzo furans
RGS	Regulatory Guidance Series
SAC	Special Area of Conservation
SCR	Selective catalytic reduction
SGN	Sector guidance note
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)
SS	Sewage sludge
SSSI(s)	Site(s) of Special Scientific Interest
SWMA	Specified waste management activity
TDI	Tolerable daily intake
TEF	Toxic Equivalent Factors
TGN	Technical guidance note

TOC	Total Organic Carbon
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)

1 Our decision

We have decided to grant an Environmental 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 will operate an installation which is subject principally to the Integrated Pollution Prevention and Control Directive (IPPCD) and the Waste Incineration Directive (WID).

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 that 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

The Application was duly made on 7 June 2011. 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 needed to complete that determination.

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.

We carried out consultation on the Application in accordance with the EPR, our statutory Public Participation Statement and our own RGS Note 6 for Determinations involving Sites of High Public Interest. We consider that this process satisfies, and frequently goes beyond the requirements of the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, which are directly incorporated into the IPPCD, 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 IPPCD, including telling people where and when they could see a copy of the Application. We also placed an advertisement in the Western Morning News and the Plymouth Herald on 6th July 2011.

We placed a copy of the Application and all other documents relevant to our determination on our Public Register in Exeter and also sent a copy to Plymouth City Council for its own Public Register. Anyone wishing to see these documents could do so and arrange for copies to be made. The Applicant also provided a number of copies of the Application on CD which were also made accessible from the Public Registers. Copies of the Application were also placed in Plymouth's public libraries.

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

- Cornwall County Council
- Devon County Council
- Foods Standards Agency
- Health and Safety Executive
- Health Protection Agency
- Natural England
- Plymouth City Council
- Plymouth NHS
- Queen's Harbour Master Plymouth
- Saltash Town Council
- South West Water
- Tamar Estuaries Forum
- Torpoint Town Council

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

In addition to our advertising the Application, we undertook a programme of extended public consultation. A public drop-in event was held on July 20th at the community centre in Barne Barton, written comments were also accepted by the Environment Agency after the formal consultation period had ended. Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 4. We have taken all relevant representations into consideration in reaching our draft determination.

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it. We issued two information notices on 17th August 2011 and 28th October 2011. A copy of each information notice was placed on our public register and sent to Plymouth City Council for inclusion on its register, as was the response when received.

In addition to our information notices, we received additional technical information during the determination from the Applicant on 29th July 2011. We made a copy of this information available to the public in the same way as the Applicant's responses to our information notices.

We then put our draft decision before the public and other interested parties in the form of a draft Permit, together with a draft decision document. We published our draft decision on 13th December 2011 and carried out a public consultation between 19th December 2011 and 3rd February 2012.

Copies of the draft permit and decision document were placed on our website and were available on CD from local libraries. Our consultation also well covered by the Plymouth Herald, local radio and the BBC website. A further public drop-in event was also held on January 16th at the community centre in Barne Barton. People who had attended the first event were contacted to make them aware of this event.

We have considered all relevant representations which we received in response to this final consultation and have amended this explanatory document as appropriate to explain how this has been done. Further details along with a summary of consultation comments and our response to these representations can be found in Annex 4.

3 The legal framework

The Permit is 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 Installation is:

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

By the time the incinerator comes into operation, the industrial emissions directive (IED) (2010/75/EU) will have come into force. This directive amends, consolidates and replaces 7 EU Directives on pollution including IPPC and WID. The enabling legislation to bring this into force in the UK has not yet been enacted. However, the IED does not introduce any controls more stringent than those currently in force in respect of this determination.

We address some of the major legal requirements directly where relevant in the main body of this document. Other requirements are covered in Section 7 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.

Before the incinerator can be brought into operation, as well as an environmental permit, planning permission will be required. Planning permission is a separate decision made by the local planning authority. In this case, Plymouth City Council granted planning permission on 22nd December 2011, shortly after our second consultation had begun. It is important to note that this document only considers those matters relevant to the grant of an environmental permit. However, the interaction between the planning and environmental permitting systems is considered in Section 7 of this document, and in response to some of the matters raised during public consultation in Annex 4.

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, namely:

- Section 5.1 Part A(1)(c) – incineration of non-hazardous waste in an incineration plant with a capacity of 1 tonne or more per hour.

The definition of a WID "incineration plant" includes:

> *"the site and the entire incineration plant including all incineration lines, waste reception, storage, on-site pre-treatment facilities, waste-fuel and air-supply systems, boiler, facilities for the treatment of exhaust gases, on-site facilities for treatment or storage of residues and waste water, stack, devices and systems for controlling incineration operations, recording and monitoring incineration conditions."*

Therefore, many activities which would normally be categorised as "directly associated activities" for EPR purposes, such as air pollution control plant, and the ash storage bunker, are therefore included as part of 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, supply of steam to the dockyard and the operation of a back up generator. These activities comprise one installation, because the incineration plant and the steam turbine are successive steps in an integrated activity.

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

4.1.2 The Site

The site is located in the northern section of Her Majesty’s Naval Base Devonport Dockyard in Plymouth and covers an area of approximately 7 hectares. The site is situated in an area that comprises a mix of residential, commercial and industrial properties.

To the north and north-west is the residential area of Barne Barton. There are further residential properties to the east, north-east and south-east of the site, at Weston Mill, St. Budeaux, King's Tamerton, Camel's Head, North Prospect and Keyham, as well as further afield in Saltash to the north-west, Wilcove to the west and Torpoint to the south-west.

The Weston Mill Viaduct runs close to the eastern boundary of the site and carries the main south west railway line over the nearby entrance to the naval base.

To the west of the site is a car park, and to the south lies Weston Mill Lake, beyond which the majority of the dockyard facilities are located. To the south-east is the existing Devonport Distribution Facility, which in turn is bordered to the north and south by large areas of tarmac used as loading bays and service yards. Access to the site will be from Weston Mill Drive through parts of what is currently the dockyard.

Because the installation is adjacent to and accessed from the naval base, the Application includes a number of risk assessments, which are specific to this installation, these are:

- Warships in Harbour Risk Assessment
- Nuclear Safety Case Risk Assessment
- Helicopter Flight Path Risk Assessment
- Explosives Ordnance Risk Assessment

These are considered in section 4.3.4 of this document.

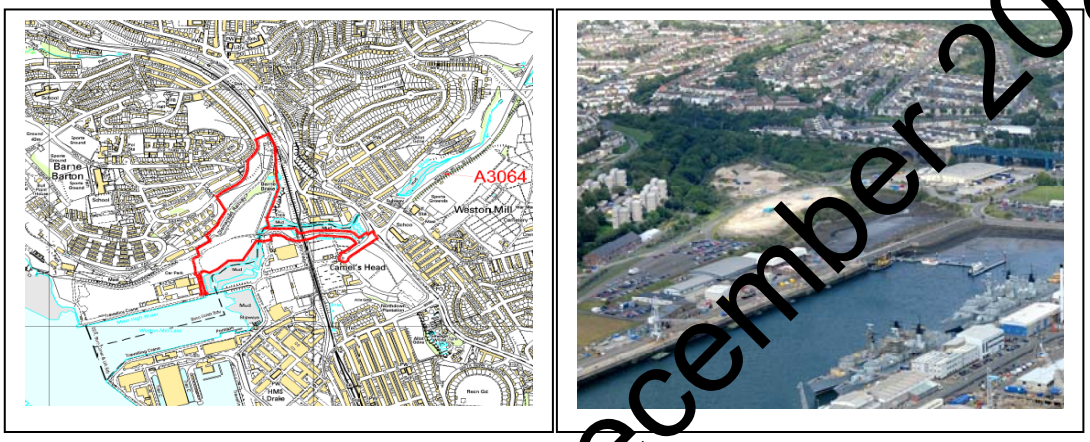
Immediately adjacent to the installation is Blackies Wood, which is a wooded area covering the slope of the hill from the proposed site of the plant and buildings up to Savage Road in Barne Barton. It is not proposed to develop this part of the site, and this part of the site will sit outside the installation boundary.

The installation is located within the Tamar Estuaries Special Protection Area. The Tamar Estuary system is a large marine inlet which receives water from a

number of catchments in Devon and Cornwall. It connects to Plymouth Sound and Estuaries Special Area of Conservation.

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

The location of the site can be identified from the map and aerial photograph below.



4.1.3 What the Installation does

The Applicant has described the facility as Energy from Waste CHP Plant. Our view is that for the purposes of WID and EPR, the installation is an incinerator because it is a plant designed to burn waste, in this case predominantly mixed municipal waste, which does not undergo any significant pre-treatment. Also, the Applicant has applied for an Environmental Permit under Section 5.1 Part A(1)(c) of Part 2 of Schedule 1 to the Environmental Permitting Regulations "incineration of non-hazardous waste in an incineration plant with a capacity of 1 tonne or more per hour".

The installation is designed with a maximum operating capacity of 265,000 tonnes per year; actual throughput is expected to be approximately 245,000 tonnes per year. This is based on a throughput of 31.1 tonnes per hour of waste with an average calorific value of 9.5 MJ/ tonne. This is equivalent to a rated thermal input of 82.1 MW.

The incinerator is of a mass burn design. Waste will be delivered by road and tipped within the main building in the Tipping Hall directly into the Waste Bunker. The waste is stored and mixed in the waste bunker prior to being burnt in a moving grate incinerator plant.

The installation also includes baling equipment and a bale store. When the incinerator is not in operation, the incoming waste will be compacted and sealed in a strong plastic film. It will then stored onsite, indoors until the

incinerator plant is back in operation when it will be re-introduced to the process.

Heat from the combustion process will be used to generate steam at high pressure. The high pressure steam will be fed to a steam turbine to generate electricity. Electricity will be supplied to the naval dockyard with any excess fed into the national grid. Lower pressure steam (9 bar) will be supplied to the Devonport dockyard. This replaces steam currently generated at the dockyard in a combustion plant burning natural gas. Heat not recovered in the form of electricity or steam will be dissipated through air cooled condensers. Consideration of energy efficiency is set out in section 4.3.7 of this document.

The installation will use a combination of techniques for treating emissions from the combustion process in order to prevent and minimise pollution. These are:

- Good combustion control
- Selective non catalytic reduction
- Dry scrubbing with sodium bicarbonate and activated carbon
- Bag filters
- A 95m chimney

The incineration process results in solid residues of incinerator bottom ash and air pollution control residues. Treatment for recovery or disposal of solid residues will take place away from the installation with only minimal storage occurring onsite.

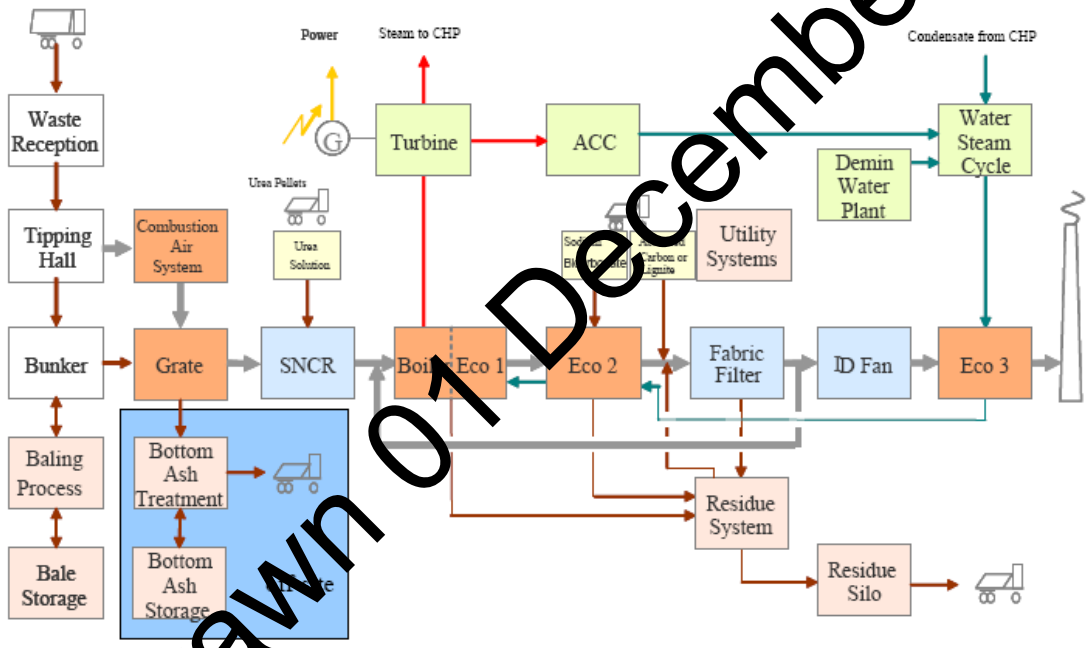
The installation processes seek to reuse and recycle all its own process water, which comprises that from periodic boiler blowdown, boiler feed water treatment residues and rainwater. However from time to time, disposal of waste water to sewer will be required.

The key features of the Installation can be summarised in the schematic diagram and tables below.

Waste throughput, Tonnes/line	265,000 tonnes/annum	31.1 tonnes / hour
Waste processed	MSW, residual household waste, commercial and industrial waste similar in character	
Number of lines	1	
Furnace technology	Moving Grate	
Auxiliary Fuel	Gas Oil	
Acid gas abatement	Dry	Sodium bicarbonate
NO_x abatement	SNCR	Urea
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon	
Stack	Height, 95m	Diameter, 2.3 m
Flue gas	Flow, 45.14 Nm^3/s	Velocity, 15.64 m/s

Reagent consumption (predicted use)	Auxiliary Fuel: 365,000 litres/annum Urea: 251 tonnes/annum Sodium bicarbonate: 4,220 tonnes/annum Activated carbon: 181 tonnes/annum Process water: 35,163 tonnes/annum Hydrochloric acid: 28 tonnes/annum Sodium hydroxide: 10 tonnes/annum	
Steam conditions	Temperature: 420 °C	Pressure: 60 bar
Electricity generated	19.3 MWe	25 MWe *
Electricity exported	16.8 MWe	22.5 MWe *
Steam exported	22.3 MWth	0
Heat use	9 bar pressure steam is tapped off for supply to the neighbouring ship yard for various process uses.	

* When operated in electricity only mode.



4.1.4 Key Issues in the Determination

The key issues arising during this determination were the assessment of emissions to air (including consideration of local weather conditions and topography) and the potential impact of noise on local residential areas. We therefore describe how we determined these issues in most detail in this document; however our consideration of all relevant issues and their potential impact on the environment and human health is described in this document.

4.2 The site and its protection

4.2.1 Site setting, layout and history

The site is currently owned by the Ministry of Defence. The immediate predecessor use of the site has been as a storage area for demolition waste from other construction projects within the naval dockyard.

The site is located on previously reclaimed land within the flood plain of the Tamar Estuary and the tidal Weston Mill Lake. The site of the proposed plant lies within Flood Zone 1 with the access road being within Flood Zone 2. The site will be raised above the required level to protect it from 1 in 1,000 year tidal flooding event or fluvial flooding.

Prior to its reclamation in the 1980's, the site was part of Weston Mill Lake and comprised mainly mud flats. The Barne Barton stream runs down the eastern side of the site and flows into Weston Mill Lake. Weston Mill Lake connects to the dock and the Tamar Estuary via a box culvert.

The site is located on a minor aquifer. The overlying soils are of relatively high permeability with little ability to attenuate pollutants. The site is not located in a groundwater source protection zone. There is one groundwater abstraction point located 1,600m to the north east for general farming and domestic use. There are 2 licensed water abstraction sites within the Dockyard for non-evaporative cooling and a further 27 abstraction points within 1Km. Upstream of the installation is a sewage works operated by South West Water which discharges treated water into Weston Mill Lake.

The site of the installation used to be part of Weston Mill Lake and was reclaimed between 1982 and 1985. Since this time the site has been used for a variety of uses including storage, sports courts and a local car crime project. The most recent use has been for the temporary storage and crushing of demolition materials. The area to the south of the site of the installation has been in use as a naval dockyard for around 100 years.

Given the past uses of this site, some level of pre-existing contamination, including the possible presence of explosive ordnance cannot be ruled out. Addressing these concerns is largely a matter for the planning process. Appropriate environmental advice can be given by the Environment Agency in support of meeting any conditions arising from the planning process.

The Application Site Report indicates a high level of vulnerability to the ground and to water of any pollution that would arise at the application site. However incineration plants generally have a low risk of such pollution. This is because most activities are located indoors, above ground on a concrete base. There will be no discharge to water from the site other than clean uncontaminated rainwater.

IPPC requires that the site be returned to a satisfactory state following the closure of the permitted activities, as part of the eventual surrender of the

permit. This requires that there should be no deterioration to the site. The Applicant has carried out a survey of soil and groundwater conditions in August 2010 and the results of this study are summarised in the Application. The Environment Agency is satisfied that the Application contains sufficient information to adequately describe the condition of the land prior to the commencement of the proposed activities.

In the event of a flooding event, the installation will be designed and built in a manner than will minimise the risk of flood waters reaching potentially polluting materials. These issues are considered in further detail in the next section.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The Applicant proposes to develop the site without deep excavation and the minimum of underground infrastructure. There will be a need for below ground pipes and sumps for the management of surface water, other than this all activities will take place above ground on concreted surfaces. All raw materials will be stored in above ground tanks and vessels. Overall the drainage system is designed to ensure that pollution does not enter the watercourses adjoining the site.

The Operator has stated that all bulk materials storage will be designed and built to the appropriate design codes with overfill alarms linked to automated control systems. All liquids storage tanks will be located in bunded areas each capable of holding 110% of the tank volume. Physical barriers will be built at tanker offloading points to prevent accidental loss through collision damage. Floor areas will be designed to promote any material flow to dedicated drains or containment sumps.

Other than waste, the main raw materials used at the installation will be: diesel fuel oil, urea, powdered activated carbon and sodium bicarbonate. Hydrochloric acid and sodium hydroxide will also be used for the regeneration of ion exchange columns used for producing demineralised water. Small quantities of corrosion inhibitors and lubricant oils will also be present onsite along with calibration gases for the monitoring equipment.

Quantities of incinerator bottom ash (IBA) and air pollution control (APC) residues will also need to be stored on site awaiting offsite recovery or disposal.

Bulk storage facilities are proposed as follows:

Urea:	50m^3 silo
Sodium bicarbonate:	150 m^3 silo
Activated carbon:	80 m^3 silo
APC residues:	2 x 185 m^3 silos
Incinerator bottom ash:	1,540 m^3 concrete bunker

Diesel:	30,000 litre storage tank
Sodium hydroxide:	$5m^3$ storage tank
Hydrochloric acid:	$3m^3$ storage tank
Oil wastes:	Secure drum containers

Rainwater will be harvested from buildings roofs, roads and hard standing areas for use as landscape irrigation and dust suppression on the site roads if needed. Wastewater from boiler blowdown, boiler water sampling and demineralised water treatment will be reused for quenching the bottom ash. Under normal circumstances there should be no water discharge.

4.2.3 Closure and decommissioning

The Applicant has provided a Site Closure Plan as part of their Application. In the Site Closure Plan it states that the Applicant proposes to operate the installation for a minimum of 25 years. Elsewhere in the Application it references the design lifetime of some elements of the plant as 30 years, and through comparisons with the Applicant's plant at Mannheim (Germany) suggests that the plant could be operational for as long as 40 years.

The Site Closure Plan therefore only sets out in outline, the process that will be followed for the decommissioning and dismantling of the plant and equipment and site clearance at the end of the site's lifetime. The Site Closure Plan will form part of the Operator's Environmental Management System and we are satisfied that it forms a proper basis for this purpose.

At the time of closure, the Operator has to satisfy us that the necessary measures have been taken, both to avoid any pollution risk resulting from the operation of the Installation, and to return the site to a satisfactory state, having regard to the state of the site before the Installation was put into operation. To do this, the Operator has to apply to us for Surrender, which we will not grant unless and until we are satisfied that these requirements have been complied with.

When considering a Surrender Application, we will have regard to the condition of the land at the grant of the permit (which is described in this permit Application), and the operational history of the site which will be documented through the reports produced over the lifetime of the permit as specified in the permit.

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation. MVV Environment Devonport Limited is a new company set up to operate the proposed incinerator installation. It is however part of MVV Umwelt, which is a German company with experience of building and operating waste management facilities at four locations in Germany.

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

The incineration of waste is not a specified waste management activity (SWMA). The Environment Agency has considered whether any of the other activities taking place at the Installation are SWMAs and is satisfied that they are not.

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

4.3.2 Environmental Management

The Applicant has stated in the Application that they will implement an Integrated Management System which brings together the requirements of Quality, Environment and Health and Safety Management Systems in one place. The Applicant has stated that the Environmental Management System (EMS) component of the Integrated Management System will be certified under ISO14001.

The Environment Agency recognises that certification of the EMS cannot take place until the Installation is operational. MVV operate to ISO14001 at other locations, and propose to achieve accreditation during the first 18 months of operation. An improvement condition (IC1) is included requiring the Operator to report progress towards gaining accreditation of its EMS at this time.

The applicant has indicated that the total staffing requirement of the installation once fully operational will be 35 posts. The applicant has summarised the roles and responsibilities of each post. Environmental compliance is a specified responsibility of the Technical Director supported by the Health, Safety and Environmental Manager.

The Applicant has included within their application a document setting out the scope of their proposed EMS, which the Environment Agency considers satisfactory. The Applicant has not included at this stage detailed procedures covering all aspects of the EMS. A pre-operational condition (PO1) is included requiring the Operator to update their EMS summary prior to commissioning of the plant and to make available for inspection all EMS documentation.

However, from the information provided, 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

The site will be separated from the HMNB Devonport by means of a new security fence. The Operator will have full security control without disruption from MoD activities. Traffic entering and leaving the installation will not be subject to MoD security procedures.

Site boundaries will be protected by a 2.4m high security fence, access will be through controlled gates. CCTV will be in operation. Access to operational areas within the building will be by means of an electronic key card system. All visitors will be required to sign in and out at the weighbridge.

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.

It is however possible that an incident at the dockyard could result in the incinerator having to implement a controlled shut down. This is considered in the next section.

4.3.4 Accident Management

In Environmental Permitting, the purpose of the Accident Management Plan is to prevent accidents that could give rise to pollution. Whilst some accident scenarios (and others not covered here) are potential risks to the health and safety of staff and the public, these matters are controlled under the Health and Safety at Work Act 1974, and only the environmental protection aspects are considered here.

The site is not subject to the Control of Major Accident Hazards (COMAH) Regulations 1999, nor the 2005 amendments to these regulations as it does not store any of the substances listed in the regulations above the threshold quantities identified in the regulations. There is therefore no requirement for an offsite emergency plan.

The Applicant has submitted an Accident Management Plan, as part of the Application, and has identified a list of hazardous events that could give rise to an accident giving rise to pollution. The Applicant has then assessed these scenarios on a 6 point scale for consequence and frequency. Finally the Applicant has considered the effectiveness of mitigation measures also on a 6 point scale.

The Accident Management Plan forms part of the Environmental Management System, and the Application shows how the plan sits within the overall EMS.

There will in addition be detailed procedures for the safe shutdown of the incinerator plant not just in the event of an accident or emergency, but also in the event of failure to comply with permit conditions over the combustion conditions or emissions to the environment. The Accident Management Plan

contains a high level Emergency Plan. An example copy of the emergency plan for the German plant is also included.

The site lies within a flood risk zone. The Environment Agency has provided comments to the local planning authority concerning the matters relevant to planning policy. From a permitting perspective, the Environment Agency needs to be satisfied that in the event of a flood, there will not also be a pollution incident arising from mobilising materials stored on site. This forms part of the Applicant's accident management plan, and we are satisfied that appropriate precautions are in place.

The Applicant proposes to control fire risk through installing a water deluge system to quickly douse any fire that might arise in the waste bunker and water cannon that can be directed to the bale store and the waste bunker if required. Article 8(7) of WID requires that sufficient fire water retention capacity is provided within the installation to be able to retain any contaminated fire water used in fire fighting. The Applicant can contain contaminated fire fighting water within the bunker equivalent to 275 minutes of operation of the fire fighting equipment. The Applicant has 3 fire hoses available in the boiler house. This fire water would be directed to incinerator bottom ash bunker which has a retention capacity for 200 minutes of operation of these hoses. It is considered highly unlikely that operation of the fire fighting systems for periods longer than the retention times would ever be required. Therefore the Environment Agency is satisfied that the requirement of Article 8(7) or WID is satisfied.

Having considered the Plan 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.

In addition, due to the unique circumstances arising from the location of the installation adjacent to HMNB Devonport. The Operator has included within their Accident Management Plan, the following risk assessments.

(i) <u>Warships in Harbour Risk Assessment</u>

This document was written by the Devonport Explosive Safety Advisory Group. The purpose of this assessment is to consider whether the proposed incinerator poses any risk to berthed warships or vice versa.

The assessment makes two recommendations for additional risk reduction measures, these are keeping windows to a minimum using MoD specification glazing materials; and requiring the plant to implement its emergency evacuation procedure in the unlikely event of a naval base incident.

The assessment confirms that the incinerator is located outside the area where restrictions relating to explosives at the naval base would apply.

The assessment indicates an increased level of risk associated with this and another project called the Devonport Landing Craft Co-location Project. However the increased risk appears to arise from an increase in the number of persons exposed to the hazards present rather than from any increase in the level of hazard.

ii) Nuclear Safety Case Risk Assessment

This document is an unclassified document from Defence Equipment and Support, which is a division of the MoD. Again the purpose of the assessment is to consider whether the presence of the incinerator poses additional risk to the dock yard and vice versa.

The assessment identified 4 hazards arising from the incinerator that needed to be assessed. These are:

- Turbine Blade Ejection
- Burst Steam Drum
- Burst High Pressure Gas Cylinder
- Exploding Acetylene Gas Cylinder

The study concluded that none of these had the potential to have any direct nuclear safety related consequences. The Environment Agency does not consider that these hazards are likely to give rise to a pollution incident.

The assessment further considered the presence of additional people working at the incinerator. Comparison is made with the level of risk at the school at Camels Head. Again this does not indicate any increase in hazard. It is noted that changes will need to be made to the Naval Base offsite emergency plan, which are matters that will need to be considered by the MoD, the Council and the Incinerator Operator.

(iii) Helicopter Flight Path Risk Assessment

This document is an unclassified document from Defence Equipment and Support, which is a division of the MoD. The document considers the possible interaction between the incinerator and helicopter traffic to the Naval Base. The document concludes that the main incinerator building and stack are clear of the helicopter flight path.

(iv) Explosives Ordnance Risk Assessment

The Explosive Ordnance Risk Assessment (EORA) provides an assessment of the risk of the presence of unexploded ordnance in the ground on and in the vicinity of the site and associated working areas resulting from for example, wartime activities such as bombing of Devonport Naval Base, and other general naval activities. As such this assessment is related specifically to the site development rather than any accident risk associated with the operation of the proposed facility. This is therefore not a relevant matter for the Environment Agency's permit determination, but is likely to be relevant to the construction phase of the project, which is controlled through other legislation.

Overall, in summary, arising from the specific risk assessments arising from the installation being located close to the Naval Base, the emergency plan for the incineration plant will need to make provision for the safe shut down of the plant in the event of an external incident. This needs to form part of the EMS, and so is included as a pre-operational measure (PO2).

4.3.5 Off-site conditions

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

Our consideration of the environmental impact (see Section 5) does not indicate the presence of any environmental risk that would require any off-site monitoring to be carried out. It is considered that verification of the noise modelling prediction can be completed without needing to apply an off-site condition.

4.3.6 Operating techniques

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

Description	Parts Included	Justification
The Application	Operating Techniques (sections 3.3, 3.4, 4.4, 4.5, 4.6, 5.4, 5.5, 5.7, 5.12, 6.2, 6.3, & 6.4)	Together these documents describe how the installation will be operated to ensure the best available techniques are applied.
	Emissions Management (sections 4.4, 5.2, 5.4, 6.4 & 7.4)	
	Energy Management Report (Section 5.2)	
	Odour Management Plan	
	Impact Assessment (Sections 6.4 and 7.2)	

There were no techniques for inclusion arising from the two Schedule 5 Notices, as the responses either clarified matters which were unclear in the application or amended assessments arising from the Environment Agency's observations.

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.

Waste Types and Supplementary Fuels

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.

The Applicant has estimated that it expects to burn approximately 365,000 litres of gas oil. This can only be an estimate as it is dependent on the number of start up and shut downs carried out and how frequently the auxiliary burners are required to maintain the combustion temperature above 850 ºC.

The Applicant has justified their selection of gas oil in preference to natural gas following consideration of security of supply. The Applicant accepts that burning natural gas has a lower environmental impact than burning gas oil, however the Applicant states that they are unable to obtain a gas supply that is guaranteed as uninterruptible. It is one of the permit conditions that the auxiliary burners must be used if necessary to maintain the combustion temperature above 850 ºC. As this occurrence would be an unplanned event, the Applicant believes it could not guarantee being able to meet this condition with an interruptible gas supply, whereas the Operator would always ensure sufficient gas oil was stored to fire the auxiliary burners at any time. The Applicant points out that the steam raising boilers used in the dock yard are duel fuel so that they can continue to operate should gas be unavailable for any reason.

The Applicant further notes that the incineration plant will operate without a system for bypassing the air pollution control systems, that these systems will therefore be operational during start up and shut down and are designed for abating emissions from incinerating municipal waste and therefore capable of abating emissions from burning fuel oil at start up and shut down.

The Environment Agency is satisfied that supply restrictions to natural gas make gas oil an appropriate choice. The use of gas oil meets the requirements of Article 6(1) of WID.

Waste Types

Article 4(1) of the WID requires that the Permit must list explicitly the categories of waste which may be treated. We have specified the permitted waste types, descriptions and where appropriate, quantities which can be accepted at the installation in Table S2.2 of Schedule 2 of the Permit. Only those wastes listed in Table S2.2 can be burnt at the installation.

Appendix A to the Operational Techniques section of the Application contains a list of those wastes, coded by the European Waste Catalogue (EWC) number, which the Applicant proposes to accept in the waste streams entering the plant. The Application states that the main purpose of the plant is to dispose of waste from the Southwest Devon area, which cannot be recycled reused or composted. The plant will therefore primarily receive waste municipal waste collected by the southwest Devon local authorities.

The remaining capacity will be used to dispose of similar commercial and industrial waste from local businesses in the surrounding area.

We have reviewed in detail the list of wastes proposed in the Application, and questioned the Applicant on the inclusion of a number of the codes. Specifically:

(i) A number of waste types were identified as having little or no intrinsic calorific value, which might make then unsuitable for incineration i.e. metals, glass, and inert building wastes. These wastes have the EWC codes 150104, 150107, 190401, 191202, 191203 and 191209.

In response to our questions, the Applicant agreed concerning the matter of low calorific value and stated that only small quantities of these waste streams might be present although not necessarily pre-separated in the residual waste that was received at the site. The Applicant also said that small volumes of these wastes might be received from commercial and industrial waste producers and anticipated these would be limited to wastes deemed 'not suitable for recycling / recovery' as identified by the producer or received as a residual material from a waste treatment facility. The Applicant therefore requested that these codes were permitted.

We have concluded that where these wastes form part of residual municipal waste, the whole of that residual waste stream is best described by the EWC code 200301. However, we do accept that small quantities of this waste might be received as part of commercial and industrial wastes, but because there is low intrinsic calorific value in these wastes, we will limit the total quantity of such wastes to less than 5% of the total. This limit has been included in table S2.2.

(ii) A number of waste types were identified as having potentially high levels of water / moisture which could adversely impact on combustion conditions and make then unsuitable for incineration. These wastes have the EWC codes 020106, 020501, 020701, 020702, 020704, 190601, 190606, 190801, 200303, 200304, 200305 and 200306.

The Applicant has responded that they do not intend to receive waste code 200305 and this has not been included in table S2.2.

In relation to the other wastes in this list, the applicant has indicated that these wastes will have been dewatered prior to delivery at the installation and that the small quantity of such wastes will not result in conditions detrimental to good combustion. We therefore accept that these wastes should be received but have modified condition 2.3.3 to require that cleaning residues have been dewatered, where practicable, prior to their receipt. Pre-operation condition PO3 requires the operator to set out their waste acceptance procedures, and this will be required to state the procedure for compliance with permit condition 2.3.3.

(iii) One waste type was identified as having potentially hazardous properties which could make it unsuitable for incineration designed for non-hazardous waste. This waste has the EWC code 200137.

In response the Applicant has stated that code 200137 is a mirror entry. That it is not the applicant's intention to receive hazardous waste, but that small quantities of this type of waste might be present in mixed waste. The applicant points out that this is a mirror code entry and the waste is only hazardous if dangerous substances are present above threshold levels and that these should not be exceeded.

Our view is that where this type of waste is a minor component of a mixed waste stream, the whole of that waste stream is best described by the appropriate mixed waste code. We have retained the waste code in the waste list, provided the threshold levels for classification as hazardous waste are not exceeded. The way in which this will be achieved should be set out in the waste acceptance procedure submitted in response to pre-operation condition PO3.

(iv) A number of waste types were identified as having been separately collected for recycling or recovery. Thus incineration of such wastes could result in the diversion of these wastes from a process higher up the waste hierarchy. These wastes have the EWC codes 150101, 150102, 170203, 191201, 191204, 200101 and 200139.

The Applicant has replied that it is not their intent to divert waste from recycling and recovery operations. The applicant does not accept that waste codes 150101, 150102, 170203, 191201 and 191204 have necessarily been separately collected for recycling. For codes 200101 and 200139, the applicant states that in their experience not everything separately collected can always be recycled.

We accept that these wastes can be received but have modified condition 2.3.3 to require that where materials have been separately collected for recycling, incineration will be only be permitted where the level of contamination of these waste is such that the waste would otherwise be landfilled. Pre-operation condition PO3 requires the operator to set out their waste acceptance procedures, and this will be required to state the procedure for compliance with permit condition 2.3.3.

(v) A number of waste types were identified as having potential to give rise to a high loading on the abatement plant from metals in the waste. These wastes have the EWC codes 040108, 090107 and 191004.

The Applicant has replied that the quantity of these materials will be very low and whilst these materials do have the potential to give a high loading of some materials to the abatement plant, the quantity is so low that this is unlikely to happen in practice. We have therefore decided

to limit the quantity of such wastes to 1% by weight of the total incinerated.

(vi) Two of the waste types were identified as not being sufficiently well specified. These wastes have the EWC codes 200199 and 200399. The Applicant responded that these codes were included in the application to be able to respond to periodic requests from the local council to receive wastes relating to their statutory duties such as the clearance of fly tipped waste. The Environment Agency accepts that such wastes may at first be difficult to characterise and so they have therefore been included, but the operator will be required to keep a detailed record of all wastes received under these '99' codes as part of their waste acceptance procedures, see pre-operation condition (PO3).

(vii) A number of the waste types were identified as having a higher odour potential than other wastes entering the plant. The wastes with higher odour potential are 020102, 020106, 020202, 020203, 020304, 020501, 190604, 190606 and 200306.

The Applicant has replied that these materials make up only a small proportion of the waste received and that their assessment of odour impact from the installation made pessimistic assumptions and was assessed against benchmarks for odours considered highly offensive. This showed that odour was unlikely to be detectable outside the site boundary. These codes have therefore been included.

Following our assessment, we are satisfied that the Applicant can accept the wastes contained in Table S2.2 of the Permit because: -

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

We have limited the capacity of the Installation to 265,000 tonnes per annum. The nominal throughput of the plant is 245,000 tonnes per year, which is based on the installation operating 7,884 hours per year (90% of total hours) at a nominal capacity of 31.1 tonnes per hour. In limiting the plant to 265,000 tonnes per annum, account is being taken of the fact that a higher level of availability than 90% is possible or that a higher feed rate may be needed in the event that the CV is less than 9.5 MJ/Kg.

We have further restricted the operation of the plant by limiting the throughput of low calorific wastes to less than 5% of the total and wastes that could give

rise to high loading of some metals on the abatement plant to less than 1% of the total. The reasons for these restrictions have been set out above.

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 6(6) of the WID, which requires that heat "*shall be recovered as far as practicable*". This issue is covered in this section.

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

(ii) Use of energy within the Installation

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

The Application details a number of measures that will be implemented at the Installation in order to increase its energy efficiency; these have been included in table S1.2 of the permit. The Applicant has stated that they will implement an energy management system in compliance with BS EN 16002:2009.

In their H1 assessment, the Applicant states that they estimate using 350 MWh/yr of electricity from the public supply (which equates to 840 MWh/yr of primary energy), and 19,418 MWhr/yr from burning gas oil. Approximately 10% of the electrical output will be used for the plant's parasitic load; this is reported as 19,701 MWh/yr.

This equates to a specific energy consumption by the incineration plant of 163 kWh/tonne of waste assuming a waste throughput of 245,000 tpa.

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

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

The BREF also says that it is BAT to reduce the average installation electrical demand to generally below 150 kWh/tonne of waste with an LCV of 10.5 MJ/kg. Considering electrical demand alone, the figure for this installation is 84 kWh/tonne of waste based on an LCV of 9.5 MJ/kg.

From the information provided in the Application, the specific energy consumption at the installation will be in line the indicative figures in the BREF as set out above.

(iii) Generation of energy within the Installation - Compliance with Article 6(6) of the WID

Article 6(6) of the WID requires that heat "*shall be recovered as far as practicable*". The Government's guidance on the WID (WID EPR Guidance, March 2010) lists the following hierarchy of heat recovery options, with (e) as the least preferred option and the optimum being a combination of the other four options:

a) use of waste heat from boiler water cooling system
b) use of a boiler for steam generation or electricity generation
c) use of exhaust steam for process heating or CHP schemes
d) internal heat exchange for primary air heating and/or flue gas reheating
e) no heat recovery.

The Installation will primarily generate electricity, but will also provide heat in the form of steam, which will feed into the dockyard steam system. The Applicant states that the average level of energy recovery from the incinerator will be 89% and will be around 49% in the winter when steam demand is at its highest.

Should the plant be required to operate in electricity only mode, the Applicant states that energy recovery will drop to 27.4%. The Applicant claims this would still compare favourably with other incineration plant in the UK, which typically only achieve 23% under electricity only conditions.

The reason for improved energy recovery in comparison with other incineration plant is the production of higher pressure steam. The incinerator is used to generate steam at 60 bar pressure and 420 deg C. This compares with 40 bar pressure and 400 deg C typically found in many UK incineration plants. The Applicant says that the investment in higher specification

materials of construction to cope with the higher boiler pressures brings benefits not just in terms of energy recovery, but of lower maintenance and longer plant life.

When operating in CHP mode, medium pressure steam will be extracted from the turbine and fed into the dockyard steam distribution system. This reduces the electrical output but increases the overall energy recovery.

	Electrical Output	Steam Output	Recovery
Electricity Only	22.5 MW	0	27.4 %
CHP	16.8 MW	23.3 MW	48.8 %

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

In electricity mode, the plant will generate 9.2 MW of electricity per 100,000 tonnes / annum of waste, which equates to 0.72 MWh/tonne of waste based on a LCV of 9.5 MJ/Kg. From the information in the Application, the incinerator will operate at the high end of the indicative BAT range.

The SGN and the WID both require that, as well as maximising the primary use of heat to generate electricity; waste heat should be recovered as far as practicable, i.e. by identifying and utilising opportunities for Combined Heat and Power (CHP) and district heating.

The electrical output will be provided to the dockyard with any surplus exported to the National Grid. The plant will be designed and installed to enable the extraction of steam from the steam turbine casing at 9 bar. This will displace steam currently produced by the North Yard boilers which are duel - fuelled (natural gas / gas oil), this demand is seasonal mainly in winter months. Steam will also be used to supply the Fleet Accommodation Centre (FAC), which has a demand all year round.

The Operator has indicated that they will schedule incinerator downtime for maintenance to coincide with periods of low steam demand in order to maximise energy recovery over the year.

The total annual gas demand for the dockyard has been estimated at 103,000 MWh of which 88,600 MWh is at the North Yard and 14,400 MWh at the South Yard. 14,420 MWh of the North Yard demand is used by the FAC. Overall gas demand is expected to reduce by the equivalent of 82,200 MWh as a result of this proposal all at the North Yard. The Applicant states that it is currently not economic to meet the demands of the South Yard.

In terms of the development potential within the dock yard area. Demand from the North Yard is expected to decline, whereas there is development potential to expand activities in the South Yard. The availability of steam from

the incinerator through an upgraded network could support any expansion or economic regeneration in the South Yard. The Operator states that the supply of steam outside of the North and South Yards would be difficult because of the hilly terrain.

Nevertheless, there appears to be the potential to further improve energy recovery by extending steam supply to the South Yard. Condition 1.2.1(b) requires energy recovery to be reviewed every 4 years. Improvement Condition 2 (IC2) brings forward the first review under this condition to 2 years from the commencement of burning waste, and requires specific consideration of extending steam supply to the South Yard.

The Operator reports on their initial consideration of the additional supply of hot water through district heating systems in the neighbouring residential areas of Barne Barton, Keyham, St Budeaux and Weston Mill. Establishing a district heating network to supply local users would involve significant technical, financial and planning challenges. From the Application, there is a lot more work to be done before a viable project could be developed. Nevertheless that potential does exist. The further review of the potential for district heating is included as part of improvement condition 2 (IC2).

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

(iv) <u>R1 Calculation and the DEFRA Good Quality CHP Scheme</u>

The Operator is seeking accreditation under the DEFRA Good Quality CHP Scheme. This process does not form part of the matters relevant to our determination, but forms part of financial aspects of the project drawing down funding through Renewable Obligation Credits (ROCs). Gaining accreditation under the scheme is however an indication of achieving a high level of energy recovery. Our consideration of energy recovery is described in the preceding paragraphs and we are satisfied that the level of recovery being achieved meets all the statutory requirements.

The Applicant has also presented a calculation of the R1 factor (as defined under the WFD 2008). The R1 formula is also a measure of the extent to which energy is recovered from incineration plant. The formula is:

R1 = (Ep – (Ef + Ei)) / (0.97 x (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 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.

The Applicant claims that the R1 factor for the Devonport Incinerator will be 1.1 (when heat is recovered) and 0.95 (when heat is not recovered).

However based on the information in the Schedule 5 response, our calculations show:

	Electricity Only (GJ/yr)	Full CHP (GJ/yr)
Ep	1,843,969	2,203,626
Ef	34,953	34,953
Ew	2,330,195	2,330,195
Ei	3,280	3,280
R1	0.79	0.94

From the above, given that for significant periods of time, the plant will operate in CHP mode, it can be expected that the R1 threshold of 0.65 should be readily achieved.

Since the Application was received, the Environment Agency has issued guidance and a calculation spreadsheet for calculating the value of the R1 factor. It is a matter for the Applicant whether or not it wishes to make a formal application for R1 status. Should it do so, the application process will provide a more accurate figure for the R1 factor.

(v) Choice of Steam Turbine

The Applicant proposes to use a high efficiency single shaft condensing steam turbine. The turbine will drive a water cooled synchronous generator via a reduction gearbox.

(vi) Choice of Cooling System

The Applicant proposes to use a finned tube air cooled condenser to condense the exhaust steam from the steam turbine. It is based on an A-shaped configuration with 7 cooling fans in a single row. The Applicant states that the system is of a very low noise design with sound optimised slow running fans. The system is design to take the full heat load from the incinerator, so that the incinerator does not need to shut down if the turbine is not operational.

In choosing an air cooled system, the Applicant has also considered the options of using a sea water cooling system and a hybrid system. The sea water option was dismissed because of the extensive engineering works that would have been necessary. Although close to the sea, and taking into account the tidal range in the Tamar estuary, the closest suitable location for the inlet / discharge of the cooling water would have been over 700m from the installation. The air cooled condenser is preferred to a hybrid system because it produces less noise, which is important given the location close to residential areas.

(vii) Permit conditions concerning energy efficiency

Condition 1.2.2 and improvement condition IC2 will ensure that waste heat from the plant is recovered as far as possible.

The Operator is also 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. Together with the total quantity of waste burned per year, this will enable the Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency is less than proposed.

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

4.3.8 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 Applicant has described a number of measures in the Application to minimise the use of water on the day to day aspects of site maintenance and meeting staff welfare needs.

The Operator is required to report with respect to raw material usage under condition 4.2 and Schedule 5 of the permit. This includes the consumption of sodium bicarbonate, activated carbon and urea 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 4.2.2. 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 incinerator bottom ash (IBA) and air pollution control (APC) residues. There will also be a small quantity of waste oils.

Condition 1.4.1 of the permit requires the Operator to apply the waste hierarchy referred to in Article 4 of the Waste Framework Directive to waste generated by the activities at the installation. Article 4 sets out the following hierarchy – (a) prevention, (b) preparing for re-use, (c) recycling, (d) other recovery (e.g. energy recovery) and (e) disposal.

Waste will be prevented in the following ways:-

(i) 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. Estimated production of IBA is 58,800 tonnes per year. This estimate takes into account the absorption of water from the quench pit, which is estimated to contribute approximately 20% of the weight of the ash.

(ii) Optimising the operation of the air emissions abatement plant to optimise the addition of sodium bicarbonate and activated carbon reagents to ensure effective abatement whilst not producing excessive quantities of residues, this is set out in improvement condition (IC3). Estimated production of residues is 8,675 tonnes per year.

(iii) Oil wastes will arise from maintenance activities and are not expected to exceed 10 tonnes per year.

Incinerator Bottom Ash

Ash is a combustion product and so re-use (the next step in the waste hierarchy) is not applicable, however with further processing IBA can be recycled. It is not proposed that IBA processing will be carried out on site. Material will be simply conveyed to a stockpile from the ash quench pit and transported from there to another facility off-site for recovery. The off-site facility will recover metals and produce an aggregate material for use in

construction. This is recycling within the meaning of the waste framework directive. Material within the ash which is not suitable for recycling will require disposal by landfill. The material will be low in calorific value and so unsuitable for further energy recovery. The Applicant estimates that approximately 8,800 tonnes of ferrous and non-ferrous metals will be recovered from the IBA, with approximately 2,700 tonnes being unsuitable for anything other than landfill.

Most incinerator bottom ash (IBA) is likely to 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 WID. Classification of IBA for its subsequent transport, use or disposal is controlled by other legislation and these controls are not duplicated within the permit. It should be noted that IBA is capable of being recycled even if it is classified as hazardous waste. The Environment Agency is satisfied that the Applicant's proposals for IBA are BAT and meet the requirements of the Waste Framework Directive.

Air Pollution Control Residues

Air pollution control (APC) residues from flue gas treatment are normally classified as hazardous waste. The Operator proposes to store these in silos and then transport them for disposal.

APC residues from the incineration plant will comprise a mixture of the sodium bicarbonate and carbon reagents used in the air abatement plant together with the pollutants which have reacted with or been absorbed by these reagents and particulates from the combustion process removed by the filter plant.

The Applicant has stated that there is currently no viable alternative to treatment and disposal of this material in a suitably licensed landfill site. The Applicant has made reference to the DEFRA strategy document for the management of hazardous wastes in England and said they are aware of recovery and recycling techniques under investigation and that they will keep the area under review.

Condition 1.4.2 of the permit requires techniques for improving the avoidance, recovery or disposal of waste to be reviewed every 4 years. Improvement condition (IC7) brings forward the first review of techniques to 2 years from the date that waste is first burnt.

In order to ensure that the IBA and APC residues are adequately characterised, pre-operational condition (PO4) 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 Applicant states that waste oils from maintenance activities will be sent offsite for recovery and reuse.

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.

5. Minimising the Installation's environmental impact

Regulated activities can present different types of risk to the environment, including: odour, noise and vibration, accidents, fugitive emissions to air and water, releases to air, discharges to ground or groundwater, global warming potential and generation of waste. Consideration may also have to be given to Photochemical Ozone Creation Potential (POCP) and the effect of emissions being 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.

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

5.1 Assessment Methodology

5.1.1 Application of Environment Agency H1 Guidance

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

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

The H1 methodology uses a concept of "process contribution (PC)", which is the estimated concentration of emitted substances after dispersion into the receiving environmental media at the point where the magnitude of the concentration is greatest. The guidance provides a simple method of calculating PC primarily for screening purposes and for estimating process contributions where environmental consequences are relatively low. It is based on using dispersion factors. These factors assume worst case

dispersion conditions with no allowance made for thermal or momentum plume rise and so the process contributions calculated are likely to be an overestimate of the actual maximum concentrations. More accurate calculation of process contributions can be achieved by mathematical dispersion models, which take into account relevant parameters of the release and surrounding conditions, including local meteorology – these techniques are expensive but normally lead to a lower prediction of PC. The Applicant has the choice to use either method.

Screen Out Insignificant Emissions

Once short-term and long-term PCs have been calculated (either by dispersion factors or modelling), they are compared with Environmental Quality Standards (EQS) referred to as "benchmarks" in the H1 Guidance.

Where an EU EQS exists, the relevant standard is the EU EQS. Where an EU EQS does not exist, our guidance sets out a National EQS (also referred to as Environmental Assessment Level - EAL) which has been derived to provide a similar level of protection to Human Health and the Environment as the EU EQS levels.

PCs are considered **Insignificant** if:

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

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

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

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

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

Decide Whether Detailed Modelling is Needed

Where an emission cannot be screened out as insignificant as a PC through applying the first stage of our H1 Guidance, it does not mean it will necessarily be significant.

In these circumstances, the H1 Guidance justifies the need for detailed modelling of emissions, long-term, short-term or both, taking into account the state of the environment before the Installation operates, where:

- local receptors may be sensitive to emissions;
- released substances may fall under an Air Quality Management Plan;
- the long term Predicted Environmental Concentration (PEC) exceeds 70% of the appropriate long term standard, (where the PEC is equal to the sum of the background concentration in the absence of the Installation and the process contribution);
- the short term Process Contribution exceeds 20% of the headroom, (where the headroom is the appropriate short term standard minus twice the long term background concentration).

5.1.2 Applying the Guidance to the Application

We review the Applicant's detailed impact assessment to confirm whether or not we agree with the Applicant's conclusions with respect to H1 screening against the above criteria.

For those pollutants where the $PEC_{long\ term}$ exceeds 70% of an EQS or the $PC_{short\ term}$ exceeds 20% of the headroom between an EQS and the background concentration, we determine whether exceedences of EQS are likely. This is done through detailed audit and review of the Applicant's impact assessment taking headroom and modelling uncertainties into account. Where an exceedence of an EQS is identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation or refuse the application. Whether or not exceedences are considered likely, the application is subject to the requirement to operate in accordance with BAT.

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

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.

In this Application, the Applicant has carried out detailed air dispersion modelling. We have audited the Applicant's model and our audit report has been placed on the public register. We have applied the H1 criteria above to the model outputs, and this is described alongside the conclusions from our audit in the following sections.

5.2 Assessment of Impact on Air Quality

The Applicant's assessment of the impact of air quality is set out in Appendix B to Section 2 of Volume 2 of the Application. The assessment comprises:

- A qualitative assessment of amenity impacts during construction.
- Dispersion modelling of emissions to air from the operation of the incinerator.
- Dispersion modelling of the impact of additional road traffic arising from the operation of the incinerator.
- A study of the impact of emissions on nearby sensitive habitat sites.
- Dispersion modelling of odour impacts when the incinerator is shut down.

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

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards and the potential impact upon local habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 4.2 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The models used 5 years of meteorological data collected from the weather station at Plymouth Mountbatten between 2005 and 2009, augmented with data from Plymouth Airport and Culdrose. The Plymouth Mountbatten weather station is located in Plymouth Sound approximately 5.5 km to the south east. The Applicant claims that the weather patterns similar to that at the installation. The impact of the complex 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 those in the WID. These substances are:
    - Oxides of nitrogen (NO_x), expressed as NO_2
    - Particulate matter
    - Carbon Monoxide (CO)
    - Sulphur dioxide (SO_2)
    - Hydrogen chlorides (HCl)
    - Hydrogen fluorides (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)
    - Volatile organic Compounds
- Second, they assumed that the Installation operates continuously at the long-term WID emission limit values, i.e. the maximum permitted emissions under the WID (except for emissions of arsenic, chromium and nickel, which are considered in section 5.2.4 of this decision document).
- Third, the model also considered emissions of pollutants not covered by WID, specifically ammonia (NH_3) and Polycyclic Aromatic Hydrocarbons (PAH). Emission rates used in the modelling have been drawn from data in the WID BREF and are considered further in section 5.2.5.

We are in agreement with this approach in so far as it is used to predict the long term impacts of the incinerator. The assumptions underlying the model are conservative and precautionary.

However, we believe that the short-term WID emissions limit values should be used for assessing short term impacts. Although the Applicant has questioned this approach, they have at our request re-assessed short term impacts at the short term WID emission limit values and under abnormal operating conditions. Our consideration of abnormal operating conditions is set out in Section 5.5.

The Applicant has carried out background air quality monitoring to augment the data available from local authority monitoring. This data is summarised in the Application and has been used by the Applicant to establish the background (or existing) air quality against which to measure the potential impact of the incinerator.

As well as calculating the peak ground level concentration, the Applicant has modelled the concentration of key pollutants at 65 specified mainly residential locations within the surrounding area.

The way in which the Applicant used dispersion models, its selection of input 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 predictions of the long term environmental impact. Predicted Environmental Concentrations (PECs) of modelled pollutants are likely to be below their respective Air Quality Objectives (AQOs), Environmental Assessment Levels (EALs) and EU target value. Our predictions at sensitive ecological receptors are also in agreement with the Applicant. Following our review, the Applicant has carried out further assessment work on short term impacts.

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

5.2.1 Assessment of emissions of Nitrogen Oxides

The predicted peak ground level impact on ambient NO_2 levels is shown in the tables below.

Pollutant	Max Conc at source (mg/m^3)	Emission Rate (g/s)	Emission Rate (tpa)
NO_2 (long term)	200	11.2	352.6
NO_2 (short term)	400	22.4	

Pollutant	EQS/EAL	Background	Process Contribution		Predicted Environmental Concentration	
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	% of EAL	$\mu g/m^3$	% of EAL
NO_2	40 (1)	15.3	1.8	**4.5**	17.1	**43**
	200 (2)		22.2	**11.1**	52.8 (3)	**26**

Note 1: Annual Mean
Note 2: 99.79th %ile of 1-hour means
Note 3: Short term PEC = PC + (2 x background)

The impact on air quality from NO_2 emissions has been assessed against the EUEQS 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.

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

Impact on Air Quality Management Areas (AQMAs)

Plymouth City Council has declared two AQMAs with respect to NO_2. These are Mutley Plain and Exeter Street. Both are located in the city centre approximately 5 Km to the south east of the proposed installation. Plymouth City Council are reported by the Applicant to be considering three new NO_2 AQMAs at Tavistock Road, Stoke Village and Royal Parade, with the possibility of a city wide AQMA.

Cornwall Council is in the process of declaring an AQMA for NO_2 at Tideford. The geographic extent of this AQMA is yet to be decided. Tideford is approximately 10Km to the west of the proposed installation.

From the Applicants model, the process contribution at all points within each of the AQMAs will be well below 0.4 $\mu g/m^3$ (or 1% of the EUEQS) and can therefore be considered insignificant.

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

5.2.2 Assessment of emissions of PM_{10} and $PM_{2.5}$

The predicted peak ground level impact on ambient particulate levels is shown in the tables below.

Pollutant	Max Conc at source (mg/m^3)	Emission Rate (g/s)	Emission Rate (tpa)
PM_{10}	10	0.559	17.6
PM_{10} (short term)	30	1.67	-
$PM_{2.5}$	10	0.559	17.6

Pollutant	EQS/EAL	Background	Process Contribution		Predicted Environmental Concentration	
	µg/m^3	µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
PM_{10}	40 (1)	13.3	0.1	**0.25**	13.4	**34**
	50 (2)		1.2	**2.4**	27.9 (3)	**56**
$PM_{2.5}$	25 (1)	8.6	0.1	**0.4**	8.7	**35**

Note 1: Annual Mean
Note 2: 90.41st %ile of 24-hour means
Note 3: Short term PEC = PC + (2 x background)

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

The Applicant's predicted impact of the Installation against these EQSs is shown in the table above. The assessment assumes that **all** particulate emissions are present as PM_{10} for the PM_{10} assessment that **all** particulate emissions are present and 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 WID limit for total dust, whereas actual emissions from similar plant are normally in the range 1 to 5 mg/m^3.
- It assumes all particulates emitted are below either 10 microns (PM_{10}) or 2.5 microns ($PM_{2.5}$), when some are expected to be larger.

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

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

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

5.2.3 Assessment of emissions of acid gases, SO_2, HCl and HF

The predicted peak ground level impact on ambient levels of acid gases is shown in the tables below.

Pollutant	Max Conc at source (mg/m^3)	Emission Rate (g/s)	Emission Rate (tpa)
SO_2	50	2.79	88.1
	200	11.16	-
HCl	10	0.559	17.6
	60	3.354	-
HF	1	0.0559	1.76
	4	0.2236	-

Pollutant	EQS/EAL	Background	Process Contribution		Predicted Environmental Concentration	
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	% of EAL	$\mu g/m^3$	% of EAL
SO_2	50 (1)	7.1	0.6	**1.2**	7.7	**15**
	266 (2)		35.2	**13.2**	49.4 (7)	**19**
	350 (3)		30.8	**8.8**	45.0 (7)	**13**
	125 (4)		14.4	**11.5**	28.6 (7)	**23**
HCl	750 (5)	0.41	16.8	**2.2**	17.62 (7)	**2**
HF	16 (6)	0.003	No data			
	160 (7)		1.2	**0.8**	1.206 (7)	**1**

Note 1: Annual Mean
Note 2: 99.9th ile of 15-min means
Note 3: 99.73rd %ile of 1-hour means
Note 4: 99.18th %ile of 24-hour means
Note 5: 1-hour average
Note 6: Monthly average
Note 7: Short term PEC = PC + (2 x background)

From the table emissions of HCl and HF can be screened out as insignificant in that the process contribution is <10% of the short term EQS/EAL and there is no long term EQS/EAL set. Whilst the Applicant has not provided any data for HF impact as a monthly average, HF is a highly reactive substance and unlikely to be persistent in the environment. The Applicant's assessment against the one hour EAL has been found to be insignificant and so the monthly average impact will also be insignificant.

Emissions of SO_2 have a PC of 1.2% of the WHO guideline value as an annual mean (> 1% of the long term EQS/EAL). Even so, from the table above, the emission is not expected to result in this EAL being exceeded. Similarly the short term PC is 13% of the EUEQS (>10% of the long term EQS/EAL), again from the table above, the maximum PEC is 23% of the EUEQS and so the emission is not expected to result in this EAL being exceeded.

Whilst SO_2 emissions cannot be screened out as insignificant, the Applicant's modelling shows that the installation is unlikely to result in a breach of the EAL. The Applicant is required to prevent, minimise and control SO_2 emissions using the best available techniques, this is considered further in Section 6. We are satisfied that SO_2 emissions will not result in significant pollution. Generally, we consider the Applicant's proposals for preventing and minimising the emissions of HCl and HF to be BAT for the Installation.

5.2.4 Assessment of Emission of Metals

The Applicant has assessed the impact of metal emissions to air.

WID sets three limits for metal emissions:

- An emission limit value of 0.05 mg/m^3 for mercury and its compounds.
- An aggregate emission limit value of 0.05 mg/m^3 for cadmium and thallium and their compounds.
- An aggregate emission limit of 0.5 mg/m^3 for antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium and their compounds.

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 WID emission limits for metals along with the Application of BAT also ensures that these requirements are met.

For mercury and for other substances, the Applicant has made the conservative assumption that emissions occur continuously at the WID limit. Where WID sets an aggregate limit, the Applicant's assessment assumes that each metal is emitted individually at the relevant aggregate emission limit value, except for arsenic, nickel and chromium which have been considered separately. An emission of each metal at the aggregate WID limit is something which can never actually occur in practice as it would result in an overall breach of the WID limit, and so represents a very much worst case scenario. The Applicant has then used air dispersion modelling to compare the impacts against the relevant EQS / EAL in the H1 guidance.

The emissions data for arsenic, chromium and nickel have been taken from the AQMAU (2010) Interim Guidance to Applicants on Metals Impact Assessment for Waste Incineration Plant, published by the Environment Agency in September 2010. This guidance is based on emissions data from operational municipal waste incinerators. The data used by the Applicant is the maximum reported concentrations in the interim guidance document. The

emissions data for Chromium (VI) is based on the maximum measured ratio of 2.1% for Cr(VI) to total Cr in particulate matter from operational municipal waste incinerators as reported in the same guidance. The Environment Agency is satisfied that this is a reasonable assumption for modelling purposes.

The results of this assessment is set out in the tables below.

Pollutant	**Max Conc at source (mg/m^3)**	**Emission Rate (g/s)**	**Emission Rate (tpa)**
Cadmium (Cd) and Thallium (Tl)	0.05	0.00279	0.09
Mercury (Hg)	0.05	0.00279	0.09
Antimony (Sb), lead (Pb), cobalt (Co), copper (Cu), manganese (Mn) and vanadium (V)	0.5	0.0269	0.88
Arsenic (As)	0.003	0.00017	0.01
Chromium (Cr)	0.033	0.00184	0.06
Chromium (VI) Cr(VI)	0.00069	0.000038	0.00122
Nickel (Ni)	0.136	0.0076	0.24

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

Chromium (VI) is not specifically referenced in WID, which includes only total Chromium as one of the 9 Group 3 metals, the impact of which has been assessed above. The EPAQS guidelines refer only to that portion of the metal emissions contained within PM_{10} in ambient air. The new guideline for Chromium (VI) is 0.2 ng/m^3. Note, the 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.

The predicted peak ground level impact on ambient levels of metals is shown in the table below.

Background data in the table below has been provided by the Applicant from a local monitoring site. The Applicant has not provided a background figure for Cr(VI); so this has been assumed to be 20% of the locally measured total Cr background level, 20% is the typical value of Cr(VI) in total Cr reported in the environment in the EPAQS Guidelines.

Pollutant	EQS/EAL	Background	Process Contribution		Predicted Environmental Concentration	
	µg/m^3	µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
Cd	0.005	0.00009	0.00063	**12.6**	0.00072	**14.4**
Tl		0.00002	0.00063		0.00065	
Hg	0.25	0.00001	0.00063	**0.25**	0.00064	**0.26**
Sb	5	0.00074	0.0063	**0.13**	0.00704	**0.14**
Pb	0.25	0.00426	0.0063	**2.52**	0.01056	**4.22**
Co		0.00014	0.0063		0.00644	
Cu	10	0.00299	0.0063	**0.06**	0.00929	**0.09**
Mn	0.15	0.00201	0.0063	**4.2**	0.00831	**5.54**
V	5	0.00068	0.0063	**0.13**	0.00698	**0.14**
As	0.003	0.00041	0.00004	**1.33**	0.00045	**15.0**
Cr (II)(III)	5	0.00052	0.00042	**0.01**	0.00094	**0.02**
Cr(VI)	0.0002	0.00010	0.0000088	**4.4**	0.00011	**55.0**
Ni	0.02	0.00196	0.0017	**8.5**	0.00366	**18.3**

Note: All EALs are as Annual Means

The Applicant's assessment finds that emissions of mercury, antimony, copper, vanadium and chromium (II) and (III) would have a PC of less than 1% of the relevant EAL and so can be considered insignificant. There is no EAL for thallium or cobalt. For those metals not insignificant by this test, the Applicant's assessment finds that the PEC of cadmium, lead, manganese, arsenic, nickel and chromium (VI) would be below 70% of the relevant EAL.

From this assessment the Applicant has concluded that exceedences of the EAL for all metals are not likely to occur. Whilst all emissions cannot be screened out as insignificant, the Applicant's modelling shows that the installation is unlikely to result in a breach of the EAL. The Applicant is required to prevent, minimise and control metal emissions using the best available techniques; this is considered further in Section 6. We are satisfied that metal emissions will not result in significant pollution. The Environment Agency's experience of regulating incineration plant is that emissions of metals are in any event below the limits set in WID and for metals other than arsenic, nickel and chromium, the above assessment is an over prediction of the likely impact.

We therefore agree with the Applicant's conclusions.

5.2.5 Assessment of Other Emissions to Air

The predicted peak ground level impact of other emissions is shown in the tables below.

Pollutant	Max Conc at source (mg/m^3)	Emission Rate (g/s)	Emission Rate (tpa)
Carbon monoxide	50	2.79	88.1
TOC	10	0.559	17.6
PAHs	0.01	0.000501	0.00176
Ammonia	10	0.559	17.6
PCBs	0.005	0.000279	0.01
Dioxins and Furans	1×10^{-7}	5.01×10^{-9}	1.76×10^{-7}

Emissions of ammonia, PCBs and PAHs have been based on information contained in the WID BREF document. The Applicant has used the EQS for benzene for their assessment of the impact of TOC. This is based on benzene having the lowest EQS of organic species likely to be present in TOC (other than PAH, PCBs, dioxins and furans). The Applicant considers that 1,3 butadiene which has a lower EQS is unlikely to be a pollutant of concern from a municipal waste incinerator.

Pollutant	EQS/EAL	Background	Process Contribution		Predicted Environmental Concentration	
	µg/m^3	µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
CO	10,000 (1)	134	8.0	**0.08**	276	**2.76**
	30,000 (2)		28.4	**0.1**	296	**0.99**
VOC (3)	5 (4)	0.33	0.13	**2.6**	0.46	**9.2**
PAH (5)	0.00025 (4)	0.000121	0.000013	**5.1**	0.000134	**52.5**
NH_3	180 (4)	1	0.1	**0.06**	1.1	**0.61**
	2,500 (2)		3	**0.12**	5.0	**0.2**
PCBs	0.2 (4)	0.001724	0.00005	**0.25**	0.001774	**0.89**
	6 (2)		0.001	**0.02**	0.004448	**0.07**
Dioxins and Furans	N/A	8.5 x 10^{-9}	1.26 x 10^{-9}	N/A	9.76 x 10^{-9}	N/A

Note 1: Maximum daily running 8-hour mean
Note 2: 1-hour maximum
Note 3: VOC as benzene
Note 4: Annual Mean
Note 5: PAH as benzo[a]pyrene
Note 6: Short term PEC = PC + (2 x background)

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

From the table all the other emissions can be screened out as insignificant in that the process contribution is < 1% of the long term EQS/EAL and <10% of the short term EAQ/EAL, except for VOCs where the PC is 2.6% of the EU EQS as an average mean, and PAHs where the PC is 5.1% of UK Air Quality Strategy Objective. Even so, from the table above, the emission is not expected to result in the EAL being exceeded.

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

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

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

Impact on Air Quality Management Areas (AQMAs)

Plymouth City Council has declared an AQMA with respect to Benzene at Exeter Street. This is located in the city centre approximately 5 Km to the south east of the proposed installation. From the Applicants model, the process contribution at all points within the AQMA will be well below 1% of the EAL and can therefore be considered insignificant.

5.2.6 Consideration of Local Factors

Within the lower reaches of the Tamar and Lynher valley system, meteorological conditions can arise which give rise to atmospheric inversions. A large number of the consultation responses make reference to localised weather conditions and the topography of the application site and surrounding area.

The Applicant states that the top of the 95m high stack will be 104m AOD, which above the height of the immediate surrounding hills, which are 96m AOD. Therefore the Applicant states that emissions would never be released into the lower reaches and be subject to these inversions. The Applicant is confident that they have chosen weather conditions appropriate to the local area.

In our review of the Applicant's air modelling we have considered the issues of local weather conditions being possibly different to those used in the modelling and the impact of the local topography. This is report in Annex 1 of the AQMAU Audit report, which is on the Public Register.

Our findings are that the applicant has adequately considered the effects of terrain in their ADMS modelling assessment. To investigate the impact of local factors on the meteorological conditions, we used Met Office Numerical Weather Prediction (NWP) 2009 data produced at the location of the proposed facility. Using NWP data should take into account local scale differences in parameters such as wind direction and flow. Although there are slight differences between the wind roses for NWP at the proposed site and Plymouth Mountbatten meteorological station our check modelling indicates these differences are not sufficient enough to alter conclusions. More detail can be found in the AQMAU Audit report.

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 have 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 waste incineration directive (WID), the waste framework directive (WFD), integrated pollution prevention and control directive (IPPCD) and air quality directive (AQD).

The main conditions in an incinerator permit are based on the requirements of the IPPCD. Further specific conditions have been introduced to ensure compliance with the requirements of the WID. The aim of WID is to prevent or to limit as far as practicable negative effects on the environment, in particular pollution by emissions into air, soil, surface water and groundwater, and the resulting risks to human health, from the incineration and co-incineration of waste. WID achieves this aim by "setting stringent operational conditions, technical requirements and emission limit values". The requirements of the IPPCD include the use of BAT, which may in some circumstances dictate tighter emission limits and controls than the WID. The assessment of BAT for this installation is detailed in section 6 of this document.

ii) Environmental Impact Assessment

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

iii) Expert Scientific Opinion

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

An independent review of evidence on the health effects of municipal waste incinerators was published by **DEFRA** in 2004. It concluded that there was no convincing link between the emissions from MSW incinerators and adverse

effects on public health in terms of cancer, respiratory disease or birth defects. On air quality effects, the report concluded "Waste incinerators contribute to local air pollution. This contribution, however, is usually a small proportion of existing background levels which is not detectable through environmental monitoring (for example, by comparing upwind and downwind levels of airborne pollutants or substances deposited to land). In some cases, waste incinerator facilities may make a more detectable contribution to air pollution. Because current MSW incinerators are located predominantly in urban areas, effects on air quality are likely to be so small as to be undetectable in practice."

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

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

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

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

The **Food Safety Authority of Ireland (FSAI) (2003)** investigated possible implications on health associated with food contamination from waste incineration and concluded: "In relation to the possible impact of introduction of waste incineration in Ireland, as part of a national waste management strategy, on this currently largely satisfactory situation, the FSAI considers

that such incineration facilities, if properly managed, will not contribute to dioxin levels in the food supply to any significant extent. The risks to health and sustainable development presented by the continued dependency on landfill as a method of waste disposal far outweigh any possible effects on food safety and quality."

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

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

The **British Society for Ecological Medicine (BSEM) published a report in 2005** on the health effects associated with incineration and concluded that "Large studies have shown higher rates of adult and childhood cancer and also birth defects around municipal waste incinerators: the results are consistent with the associations being causal. A number of smaller epidemiological studies support this interpretation and suggest that the range of illnesses produced by incinerators may be much wider. Incinerator emissions are a major source of fine particulates, of toxic metals and of more

than 200 organic chemicals, including known carcinogens, mutagens, and hormone disrupters. Emissions also contain other unidentified compounds whose potential for harm is as yet unknown, as was once the case with dioxins. Abatement equipment in modern incinerators merely transfers the toxic load, notably that of dioxins and heavy metals, from airborne emissions to the fly ash. This fly ash is light, readily windborne and mostly of low particle size. It represents a considerable and poorly understood health hazard."

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

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

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

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

iv) <u>Health Risk Models</u>

Comparing the results of air dispersion modelling as part of the H1 Environmental Impact assessment against European and national air quality

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

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

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

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

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

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

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

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

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

v) Consultations

As part of our normal procedures for the determination of a permit application, we would consult the PCT and FSA. In this case we also consulted with the HPA. We also consult the local communities who may raise health related issues. All issues raised by these consultations are considered in determining the Application as described in Annex 4 of this document.

During the consultation phase of this decision, on January 24th 2012, the HPA issued a press statement establishing a new study to further extend the evidence base as to whether emissions from modern well run Municipal Waste Incinerators affect human health. The HPA will be funding the Small Area Health Statistics Unit, Imperial College London, and the Environmental Research Group, King's College London, both part of the MRC-HPA Centre for Environment and Health, to carry out the study.

The HPA statement confirms its current position that well run and regulated modern Municipal Waste Incinerators (MWIs) are not a significant risk to public health remains valid. The HPA is carrying out the study to extend the evidence base and to provide further information to the public on this subject.

5.3.2 The Applicant's Health Risk Assessment

The Applicant's health risk assessment includes consideration of effects during the construction phase of the project and from off-site vehicle movements and changes in traffic flow as well those from the operation of the installation.

Of these the health effect during construction and offsite impacts arising from road traffic have not been considered as these are essentially matters for the local planning authority when considering the parallel application for planning permission.

This section of the decision document deals primarily with the health impacts of emissions to air and their effect on the ambient air quality. It specifically considers the risk from the intake of dioxins and furans that can be emitted from the incinerator chimney.

The Applicant undertook a Human Health Risk Assessment (HHRA) to assess human exposure to dioxins and furans through direct inhalation and indirect exposure through ingestion of affected food. They used proprietary software IRAP-h View (version 4.0) for their assessment, which is based on the US EPA Human Health Risk Assessment Protocol (HHRAP). The Applicant also carried out an assessment of the intake of heavy metals, and calculated non-carcinogenic and carcinogenic risk using the US EPA methodology.

The Environment Agency has reviewed the methodology employed by the Applicant to carry out the health impact assessment and our comments on these assessments are set out in the sections below.

5.3.3 Health Effects of Emissions to Air

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

The Applicant's assessment of the impact from particulate matter, hydrogen chloride, hydrogen fluoride, thallium, mercury, antimony, cobalt, copper, vanadium, arsenic, chromium (III), carbon monoxide, ammonia and PCBs have all indicated that the Installation emissions screen out as insignificant.

Whilst the impact of emissions of nitrogen dioxide, sulphur dioxide, cadmium, lead, manganese, nickel, chromium (VI), VOCs and PAHs, 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 Applicant has also used the Committee on the Medical Effects of Air Pollutants (COMEAP) methodology to calculate health impacts of exposure from PM_{10}, $PM_{2.5}$, SO_2 and NO_2. Statutory AQOs exist for these pollutants, which are considered generally protective of the acute and chronic effects on human health. Predictions using the COMEAP methodology would therefore not normally be required or applied for the purpose of permit determination unless requested by our health consultees. Similarly the EALs for metals are set to be protective of human health. Therefore the Applicant's assessment of the intake of heavy metals made as part of their HHRA would also not normally be required or applied for the purpose of permit determination.

5.3.4 Assessment of Intake of Dioxins and Furans

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

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

The results of the Applicant's assessment of dioxin intake are detailed in the table below. The results showed that the predicted daily intake of dioxins at all receptors, resulting from emissions from the proposed facility are significantly below the COT TDI levels.

Receptor	adult		child	
Resident at location PL2	0.0038	0.19%	0.0124	0.62%
Farmer at location RNW2	0.0117	0.59%	0.0172	0.86%
Resident at location SA1	0.0002	0.01%	0.0008	0.04%

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

The Applicant predicts a maximum dioxin and furan intake of 0.86% of Committee on Toxicity (COT) Tolerable Daily Intake[1] (TDI) of 2pgWHO-TEQ/kg(BW)/day. We agree with the Applicant that the process contribution to intake of dioxins and furans is likely to be less than 1% of COT TDI.

In the UK threshold values are used (COT TDI) rather than quoting risk in probabilistic terms. Predictions below these thresholds are considered to have no measurable effect. Therefore the non-carcinogenic and carcinogenic risk predictions in the HHRA method would not normally be required or applied for the purpose of permit determination.

[1] Committee on toxicity of Chemicals in Food, Consumer Products and the Environment. Tolerable Daily Intake (TDI) of 2 picogrammes toxic equivalent (TEQ) per kilogramme human body weight per year.

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

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

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

5.3.5 Particulates smaller than 2.5 microns

The Operator will be required to monitor particulate emissions using the method set out in Table S3.1 of Schedule 3 of the Permit. This method requires that the filter efficiency must be at least 99.5 % on a test aerosol with a mean particle diameter of 0.3 µm, at the maximum flow rate anticipated. The filter efficiency for larger particles will be at least as high as this. This means that particulate monitoring data effectively captures everything above 0.3 µm and much of what is smaller. It is not expected that particles smaller than 0.1 µm will contribute significantly to the mass release rate / concentration of particulates because of their very small mass, even if present. This means that emissions monitoring data can be relied upon to measure the true mass emission rate of particulates.

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

particles, it is highly unlikely that there will be detectable effects of any particular incinerator on local infant mortality.

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

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

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

This is consistent with the assessment of this application which shows emissions of PM_{10} and $PM_{2.5}$ to air to be insignificant.

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

5.3.6 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 5.3.5). We have applied the relevant requirements of the national and European legislation in imposing the permit conditions. We are satisfied that compliance with these conditions will ensure protection of the environment and human health.

Taking into account all of the expert opinion available, we agree with the conclusion reached by the HPA that "While it is not possible to rule out adverse health effects from modern, well regulated municipal waste

incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable."

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

The Health Protection Agency, Plymouth Primary Care Trust and Foods Standards Agency were consulted on the Application. The HPA and FSA have not responded to report any concerns. A number of questions were raised by the PCT (Plymouth NHS) and our response to these can be found in Annex 4 of this document. Plymouth NHS have also provided us with a copy of the health impact assessment sent to the City Council as part of their response to the planning application. Our comments on the health impact assessment are also set out 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.

Noise can also result in an adverse impact on health. The Applicant has carried out an assessment of the impact of noise from the installation. Our consideration of this assessment is reported in section 5.6.4. Noise is not predicted to be at levels likely to result in annoyance or complaint.

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

5.4.1 Sites Considered

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

- Tamar Estuaries – Special Protection Areas
- Plymouth Sound and Estuaries – Special Area of Conservation

The Applicant has also considered the impact on receptors beyond 10Km at the request of Natural England, these are:

- South Dartmoor Woods – Special Area of Conservation 10.4 Km to the north east of the installation.
- Blackstone Point – Special Area of Conservation 14 Km to the south east of the installation.

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

- Tamar-Tavy Estuary SSSI

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

- Kinterberry Creek
- Ernesettle Complex

The Applicant has assessed the impact at a total of 41 specified locations within the above sites. As a result of our public consultation, Ham Woods has been added to this assessment.

Blackies Wood forms part of the application site with respect to planning permission, although it sits outside the installation boundary. It does not form part of the above assessment; however a local management plan for Blackies Wood forms part of the planning application.

5.4.2 Habitats Assessment

The Applicant's Habitats assessment was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that there would be no likely significant effect on the interest features of the protected sites. The predicted impact of emissions to air on Habitats sites is given in the tables below; in each table the impact at the most affected location is shown only.

(i) Assessment of emissions of Nitrogen Oxides

Pollutant	**Critical Level (EAL)**	**Background**	**Process Contribution**		**Predicted Environmental Concentration**	
	µg/m^3	**µg/m^3**	**µg/m^3**	**% of EAL**	**µg/m^3**	**% of EAL**
NO_x	30 (3)	11.6	0.583 (1)	**1.94**	12.18	**40.6**
	75 (4)		0.592 (1)	**8.71**	29.74	**39.6**
	30 (3)	16.5	0.139 (2)	**0.46**	16.64	**55.5**
	75		0.142 (2)	**1.74**	34.30	**45.7**

Note 1: Receptor E4 Plymouth Sound and Estuaries SAC Mudflats
Note 2: Receptor E11 Plymouth Sound and Estuaries SAC Mudflats
Note 3: Annual Mean
Note 4: Daily Mean

The PC for NO_x at Plymouth Sound and Estuaries SAC is at its maximum at location E4 (1.94%) as modelled by the Applicant. The PC also exceeds 1% at locations E3, E5, E6 and E10. In all cases however the PEC is well within the critical level. The peak PEC occurs at location E11 at 55.5%. Whilst emissions of NO_x cannot be screened out as insignificant, it is unlikely that emissions will give rise to an exceedence of the critical level. In all other cases the PC is less than 1% and so can be screened out as insignificant. It is not considered that there would be any likely significant effect from NO_x.

Consideration of In-Combination Effects

With respect to the impact at location E4, (which is not screened out as insignificant) the Applicant has considered whether there can be any cumulative impact from other developments in the locality. Specifically consideration has been given to the Langage Power Station, the New

England Quarry Resource Recovery Centre, Weston Mill Crematorium and the Devonport Boiler Plant.

Of these the Langage Power Station and the New England Quarry are considered to be too far away. A PC of >1% from these plants would be required at location E4 to give rise to an in combination effect.

The Crematorium and Devonport Boiler Plant should be part of the background on which the Applicant's assessment has been based. In any event steam from the incinerator will replace that from the boiler plant resulting in much reduced operation of the Devonport plant.

Therefore it is concluded that there is unlikely to be any significant effects from the proposed facility acting in combination with other developments.

(ii) Assessment of emissions of Sulphur Dioxide

Pollutant	Critical Level (EAL)	Background	Process Contribution		Predicted Environmental Concentration	
	µg/m^3	µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
SO_2	20 (2)	0.7	0.146 (1)	**0.85**	0.85	**4.23**

Note 1: Receptor E4 Plymouth Sound and Estuaries SAC Mudflats
Note 2: Annual Mean

The PC for SO_2 at Plymouth Sound and Estuaries SAC is at its maximum at location E4 (0.85%) as modelled by the Applicant. Emissions of SO_2 can therefore be screened out as insignificant in all cases.

(iii) Assessment of emissions of Ammonia

Pollutant	Critical Level (EAL)	Background	Process Contribution		Predicted Environmental Concentration	
	µg/m^3	µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
NH_3	3 (3)	1	0.029 (1)	**0.97**	1.03	**34**
	1 (3)	1.4	0.002 (2)	**0.24**	1.402	**140**

Note 1: Receptor E4 Plymouth Sound and Estuaries SAC Mudflats
Note 2: Receptor E33 South Dartmoor Woods SAC
Note 3: Annual Mean

The PC for NH_3 at Plymouth Sound and Estuaries SAC is at its maximum at location E4 (0.97%) as modelled by the Applicant. Emissions of NH_3 can therefore be screened out as insignificant in all cases. The peak PEC occurs at location E33 in South Dartmoor Woods SAC at 140%. However the exceedence of the critical level arises from the already high background levels. The PC from the incinerator is only 0.24% and therefore there would be no likely significant effect.

(iv) Assessment of emissions of Hydrogen Fluoride

Pollutant	Critical Level (EAL)	Process Contribution	
	µg/m^3	µg/m^3	% of EAL
HF	0.5 (3)	0.0029 (1)	**0.57**
	5 (4)	0.0019 (2)	**0.66**

Note 1: Receptor E4 Plymouth Sound and Estuaries SAC Mudflats
Note 2: Receptor E6 Plymouth Sound and Estuaries SAC Mudflats
Note 3: Weekly mean
Note 4: Daily mean

The PC for HF at Plymouth Sound and Estuaries SAC is at its maximum at location E4 (0.57% weekly mean) and location E6 (0.66% daily mean) as modelled by the Applicant. Emissions of HF can therefore be screened out as insignificant in all cases.

(v) Assessment of impact of nutrient nitrogen deposition

Pollutant	Critical Level (EAL)	Background	Process Contribution		Predicted Environmental Concentration	
	ka/ha/yr	µg/m^3	ka/ha/yr	% of EAL	ka/ha/yr	% of EAL
Nutrient Nitrogen	30	10.8	0.24 (1)	**0.78**	11.04	**37**
	10	22.8	0.03 (2)	**0.33**	22.83	**228**
		23.2	0.02 (3)	**0.24**	23.22	**232**

Note 1: Receptor E4 Plymouth Sound and Estuaries SAC Mudflats
Note 2: Receptor E33 South Dartmoor Woods SAC
Note 3: Receptor E35 South Dartmoor Woods SAC

The PC for nutrient nitrogen deposition at Plymouth Sound and Estuaries SAC is at its maximum at location E4 (0.78%) as modelled by the Applicant. Nutrient nitrogen deposition can therefore be screened out as insignificant in all cases. The peak PEC occurs at location E35 in South Dartmoor Woods SAC at 232%. However the exceedence of the critical level arises from the already high background levels. The peak PC from the incinerator is only 0.33% (location E33) and therefore there would be no likely significant effect.

(vi) Assessment of impact of acid deposition

The Plymouth Sound and Estuaries SAC and the Tamar Estuaries SPA are not sensitive to acid deposition.

Pollutant	Critical Level (EAL)	Background	Process Contribution		Predicted Environmental Concentration	
	keq/ha/yr	µg/m^3	keq/ha/yr	% of EAL	keq/ha/yr	% of EAL
Acid Deposition	1.63	1.55	0.0067 (1)	**0.51**	1.64	**106**
	1.66		0.0049 (2)	**0.38**	1.67	**108**

Note 1: Receptor E33 South Dartmoor Woods SAC
Note 2: Receptor E35 South Dartmoor Woods SAC

The PC for acid deposition at South Dartmoor Woods SAC is at its maximum at location E33 (0.51%) as modelled by the Applicant. Acid deposition can therefore be screened out as insignificant. The peak PEC occurs at location E35 at 108%. However the exceedence of the critical level arises from the already high background levels and the PC would have no likely significant effect.

From this assessment it can be concluded that there will be no likely significant effect on any SAC or SPA arising from the proposed incinerator.

5.4.3 SSSI Assessment

The Tamar-Tavy SSSI forms part of the Tamar Estuaries SPA and consideration of the impact has therefore been covered in section 5.4.2 above.

From this assessment it can be concluded that there will be no damage to the special features of the SSSI arising from the proposed incinerator.

5.4.4 Assessment of Non-Statutory Sites

The Applicant has modelled the impact of the installation on three local wildlife sites, namely Kinterbury Creek, Ernesettle Complex and Ham Woods, although Ham Woods has not yet been formally declared a local nature reserve, but is a provisional site.

At location E40 in the Application, a PC of 1.2% on NO_x is predicted. At the same location a PC of 2.46% on nutrient nitrogen deposition is predicted and a PEC of 175% due to a background level that already exceeds the critical level. Also at location E40 a PC of 3.18% on acid deposition is predicted and a PEC of 103%. At Ham Woods, a PC of up to 7.6% of the critical load is predicted for acid deposition and up to 5.8% of the critical load for nutrient nitrogen. Baseline deposition rates are 120% for acid deposition and 320% for nutrient nitrogen. The impact of SO_2, HF and NH_3 are less than 1%.

Whilst the PC exceeds the 1% insignificance threshold, the level of impact is low and considered acceptable for conservation features that are not designated as Habitats sites or SSSIs. The Applicant is required to prevent, minimise and control emissions using the best available techniques, this is considered further in Section 6.

Blackies Wood is an area of hillside which forms part of the development site, but lies outside of the installation boundary. It contains a number of trees and bushes which have grown over what appears to be previously developed land. The Applicant has indicated that they will implement a local management plan for this area. The area does not have any special conservation features and the future care of this area is considered to be a matter for the local planning authority as part of its determination of planning permission

5.4.5 Impact of emissions to water and sewer

The Applicant has stated that there will be no emissions of waste water other than clean uncontaminated rain water to the estuary. This will not therefore have an impact on the SAC or SPA. The Applicant proposes to use air cooled condensers, which means there will be no water abstraction from the estuary or discharge of warm water into the estuary.

From time to time it may be necessary to discharge waste water to sewer from the plant that treats water prior to its use in the boiler plant. Normally this waste stream will be used as quench water for incinerator bottom ash. Therefore discharges to sewer will be small and infrequent.

South West Water's waste water treatment plant is upstream of Weston Mill and the treated water from the sewage works discharges into the same estuary. Waste water from treating water for boiler feed will contain small quantities of chemicals used in water treatment, these will not adversely impact the performance of the waste water treatment plant, and so there will be no likely significant effect on the SAC or SPA arising from this emission.

5.5 Impact of abnormal operations

WID (Article 6(3)(c)) requires that waste shall cease to be fed to the installation 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 (i.e. the abatement plant). Not withstanding this, WID (Article 13(3)) allows for the continued feeding of waste under abnormal operating conditions – 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. WID Article 13 sets criteria for determining what is an abnormal operation condition and sets some limits regarding the duration and extent of abnormal operation which aim to ensure that the overall environmental impact is so minimised.

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 (<1% of total operating hours). As such, abnormal operating conditions are not expected to have any significant long term environmental impact unless the background conditions were already close to, or exceeding, an EQS. For the most part therefore consideration of abnormal operations is limited to consideration of its impact on short term EQSs.

WID abnormal operations are defined as any technically unavoidable stoppages, disturbances, or failures of the abatement plant or the measurement devices, during which the concentrations in the discharges into air may exceed the normal emission limit values.

For incineration plant, WID sets backstop limits for particulates, CO and TOC which must continue to be met. The CO and TOC limits are the same as for normal operation, and are intended to ensure that good combustion conditions are always maintained. The backstop limit for particulates is 150 mg/m^3 as a half hourly average, which is five times the half hourly limit in normal operation.

In making an assessment of abnormal operations the Applicant has considered a number of failure scenarios that could lead to abnormal operation. These are:

- Failure of the SNCR system for NO_x Control
- Failure of the Bag Filter for Particulate and Metal Control
- Failure of Carbon Injection System or Metal, Mercury and Dioxin Control
- Failure of Scrubbing System for Acid Gas Control
- Exceedence of CO or TOC limit

Taking these in turn –

- Failure of the SNCR system would result in unabated emissions of NO_x, which it is estimated would be of 500 mg/m^3. This is a factor of 2.5 times the level in normal operation and 1.25 times the short term ELV in WID.
- Failure (or partial failure) of the bag filter system could see particulate emissions increase up to the WID backstop limit of 150 mg/m^3. Any increase beyond this would trigger a shut down of the plant. This is a factor of 15 times the level in normal operation and 5 times the short term ELV in WID.
- The Applicant has assumed that in the event of a bag filter failure metal removal will be adversely impacted in the same ratio as for particulates. This is based on the fact that metal removal is based on adsorption of metal oxides onto the carbon injection system and subsequent removal in the bag filter.
- Failure of the acid gas scrubbing system would result in unabated emissions of SO_2, HCl and HF. These unabated emissions are estimated at 444 mg/m^3 of SO_2, 889 mg/m^3 of HCl and 89 mg/m^3 of HF. This is based on the Applicant's data on unabated emissions.
- For dioxin and mercury emissions in the absence of other data, a factor of 100 – this assumes a 99% removal efficiency in the flue gas system.

This is a worst case scenario in that WID abnormal conditions include a number of different equipment failures not all of which will necessarily result in an adverse impact on the environment (e.g. a failure of a monitoring instrument does not necessarily mean that the incinerator or abatement plant is malfunctioning).

The Applicant's has carried out an assessment of abnormal operating conditions based on the H1 methodology rather than on detailed air dispersion modelling and has concluded that abnormal operation will not result in a breach of an EQS/EAL.

We agree with this conclusion. Presented below is the effect that abnormal operation has on the short impact assessments previously presented in Section 5.2 of this document.

Pollutant	Short-Term PC (% EAL)		Short-Term PEC (% EAL)	
	Normal	Abnormal	Normal	Abnormal
NO_2	11.1	13.9	26	29
PM_{10}	2.4	12.0	58	68
SO_2	13.2	29.3	23	37
HCl	2.2	32.6	2.3	33
HF	0.8	17.8	1.0	18

None of these releases now screen out as insignificant. However, an exceedence of an EAL is not considered likely arising from abnormal operation. We have carefully scrutinised the Applicant's proposals to ensure that they are applying the Best Available Techniques to prevent and minimise abnormal operation. This is reported in section 6 of this document.

As discussed in the health impact assessment the exposure route for dioxins and furans is primarily through ingestion, which occurs over a long period of time. In the event that the plant was to operate abnormally for the full 60 hours per year and dioxin emissions were to be emitted at 100 times the rate under normal operation, the total mass release in a year would increase from 1.76×10^{-7} tonnes per year (see section 5.2.5) to 2.54×10^{-7} tonnes per year, which is an increase of 44%.

Pollutant	Max Conc at source (mg/m^3)	Emission Rate (g/s)	Time (hours / year)	Emission Rate (tpa)
Dioxins and Furans (normal)	1×10^{-7}	5.01×10^{-9}	7,824	1.44×10^{-7}
Dioxins and Furans (abnormal)	1×10^{-5}	5.01×10^{-7}	60	1.10×10^{-7}

This could result in the predicted dioxin intake also increasing by up to 44% in these circumstances. This would mean that a resident at location PL2 could see their predicted dioxin intake increase to 0.31% of the COT TDI for an adult and to 1% of the TDI for a child. A farmer at location RNW2 would see the predicted dioxin intake increase to 0.95% of the COT TDI for an adult and 1.38% of the COT TDI for a child. Whilst for a child this sees the predicted impact go above the level at which we would normally screen out the effect as insignificant. It is still well below the health standard. It also only occurs under the most extreme of worst case set of operating conditions. It is therefore expected that the true level of impact will be less than this.

The Applicant's analysis also shows that mercury emissions could be 100 times the level under normal operation. This could similarly result in an increase of up to 61% in the annual release. The long term process contribution of mercury is predicted (see section 5.2) as 0.25% of the relevant EAL. Such an increase would therefore not have a significant impact on the long term impact. The Applicant has calculated a short term process contribution of 32.6% of the short term EAL using the H1 method. We are therefore satisfied that an exceedence of the short term EAL is unlikely.

5.6 Noise Impacts

The Applicant has made an assessment of the noise impact from the construction and operational phases of the installation. This document considers only the operational phases, the control of noise during the construction phase being a matter for the local planning authority.

Sources of noise are – the Air Cooled Condenser fans, the chimney, exhaust steam pipe, transformer re-coolers HGV movements – noise internal to the building, turbine, ID fan, bailing area during shut down.

The Applicant has modelled the operational noise impact using the calculation methodology set out in ISO 9613-2. The Applicant has considered two periods of operation – daytime, when the installation will be accessed by waste vehicles; and night-time when there will be no such traffic. The daytime assessment considers the worst case situation of 23 waste deliveries from vehicles per hour. The Applicant has also considered the noise levels when the plant is not burning waste, but the baling equipment is in operation. The model considers the impact at 23 residential receptors numbered R1 to R23. These receptors are different to those also numbered R1 to R23 in the air dispersion modelling and were chosen to be representative of the worst affected areas due to noise from the site.

The model shows that the increase in ambient noise during daytime at all the receptors modelled will not exceed 1 dB(A). The largest impact is at location R21. The daytime tonal penalty of +5dB is intended to account for irregular HGV movements within the site. We sought to clarify whether this included consideration of queuing vehicles. The Applicant has subsequently modified their assessment to include the impact of 5 vehicles per hour (out of 23) having to queue for 30 minutes in the hour. This revised model indicates an increase of less than 1 dB(A) at all but 3 modelled locations. The maximum impact being at location R19 at 1.9 dB(A).

The model shows that the increase in ambient noise during night time will not exceed 2.1 dB(A). The largest impacts are locations R2, R3 and R21. The night time assessment does not include a +5dB penalty as there will be no HGV movements on site during the night time.

According to BS 4142, acoustic features requiring + 5dB correction are:

- The noise contains a distinguishable, discrete, continuous note (whine, hiss, screech, hum, etc.)
- The noise contains distinct impulses (bangs, clicks, clatters or thumps).
- The noise is irregular enough to attract attention.

The Applicant have supported not making a night time correction by taking measurements over the third octave bands at a similar site in Germany using a tone adjustment method detailed in BS 7445-2: 1991. We agree in principle that the third octave band measurement may detect the tonal features. A well designed monitoring survey considering operational processes and locations

of receptor could confirm this once the facility is operational, and this will form part of improvement condition (IC8), which seeks to verify that the noise impact from the installation will be in line with that predicted by the Applicant's model.

BS4142 indicates that increases in noise levels of less than 5 dB(A) are unlikely to result in public annoyance and complaint, and so on this basis the results are acceptable.

The Applicant has further modelled the impact of the baling and odour abatement plants, when the incinerator is not operational. The baling and odour abatement plants will operate when the incinerator plant is shut down and there is waste in the bunker. The Applicant has indicated that the incinerator plant will operate around 90% of the time. Therefore the abatement plant could operate for up to 876 hours per year. This assessment includes a 5 dB(A) penalty for both daytime and night time operation. This assessment shows an impact of up to +3 dB(A) during the day and up to 5 dB(A) at night. Although the noise impact could be higher when the incinerator is not operational, these are still at levels unlikely to result in public annoyance or complaint.

The Applicant has stated that sound power levels and internal sound pressure levels used in the assessment are based on measurements carried out at comparable waste incineration plant. The Applicant has further indicated that the acoustic performance of materials used in the construction of the buildings will be checked against the specifications used in the noise modelling work. Given that the incinerator will be located close to residential areas. The noise modelling work indicates that noise impacts will be minimised and controlled. However this assessment will require the installation to be designed built and operated to the standards underpinning that assessment. A pre-operational condition has therefore been included at PO7 to require the Operator to carry out appropriate testing and measurement to confirm that the design noise specifications have been met before commencing operations.

The Applicant has indicated that the locations used to measure background data that is then applied in the modelling work were chosen as being representative of the surrounding residential areas in consultation with the City Council Environmental Team. We are satisfied that provided the noise standards underpinning the assessment are achieved in practice that the impact of noise is unlikely to give rise to nuisance or complaint.

Noise emissions will be controlled under condition 3.5.1 of the permit. The Operator has not provided a noise management plan as the noise assessment submitted with the Application does not indicate that one is required. However in the event that noise emissions are not as predicted, the Environment Agency can intervene under condition 3.5.2 of the permit to require additional control measures.

5.7 Other Emissions

5.7.1 Odour Control During Shut Down Periods

The Applicant has modelled the impact of odour emissions during plant shutdown using the ADMS 4.2 model. The Operator has used an odour assessment threshold of 1.5 OU_E/m^3 as a 98th %ile of 1-hour means in line with the Environment Agency's H4 Guidance.

During normal operation, combustion air is drawn from within the building from the areas where waste is handled. Therefore any odours associated with the handling of waste will be drawn through the incinerator and burnt.

During periods of shutdown, incoming waste will be baled. The building ventilation air will be discharged through a 55m high chimney at ambient temperature at a velocity of 11 m/s. The peak impact has been modelled at 0.04 OU_E/m^3, which is a maximum PC of 2.7%. This is less than the 10% threshold for screening out insignificant impacts. Odour emissions can therefore be screened out as insignificant.

This model has not been subject to a detailed audit as for the emissions from the stack. However the Applicant has used the same methodology employed for the impact assessment of other pollutants, which we have found satisfactory.

The Operator has submitted an Odour Management Plan as part of their Application and this has been incorporated into the permit by including it in Table S1.2. The effect of this is that condition 2.3.1 makes compliance with the odour management plan a permit condition. Condition 3.4.1 more generally requires the operator to use appropriate measures to prevent and minimise odour.

5.7.2 Plume Visibility

Visual impact is primarily a matter for the planning authority; however the Applicant has carried out modelling to assess plume visibility from the main chimney. Plume visibility is determined primarily from the moisture content of the exhaust gas and the local weather conditions resulting in condensation.

The modelling shows that there will be a visible plume 12 to 16% of the time with an average plume length of around 50m.

We do not consider that the plume would cause pollution.

5.7.3

Photochemical Ozone Potential

The Applicant's H1 assessment contains a calculation of POCP as follows:

Substance	Annual Rate (tpa)	POCP Value per tonne	POCP
Nitrogen dioxide	352.26	2.8	986
Sulphur dioxide	88.06	4.8	423
Carbon monoxide	88.06	2.7	238
Benzene	17.61	21.8	384
Benzo-a-pyrene	0.00176	323	1
		Total	2,032

Of the above, the contribution from benzene arises from the assumption that VOC emissions occur as benzene, and that emissions of PAH occur as benzo-a-pyrene.

Individually, the PC of PAH and CO have been previously assessed as insignificant. Whilst the PC for NO_2, SO_2 and VOCs have not been screened out as insignificant, it is considered that there is very little if any risk from the incinerator of an exceedence of an air quality standard. This has been considered in Section 5.2 of this document.

POCP is an issue to be considered because high levels of ozone in the atmosphere contribute to poor ambient air quality. The POCP of substances is a factor considered when setting ambient air quality standards. Therefore it is not considered that any additional controls or conditions are required, beyond those already proposed to minimise emissions.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

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

- We then consider in particular control measures for the emissions which were not screened out as insignificant in the previous section on minimising the installation's environmental impact. They are: Nitrogen Oxides (NO_x), Sulphur dioxide (SO_2), Cadmium (Cd), Lead (Pb), Manganese (Mn), Chromium (VI), Nickel (Ni), VOCs and PAHs.

- 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) is considered, as we explain below.

WID is based on setting mandatory emission limit values. Although the WID 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. As the WID itself states, its limits are "*a necessary but not sufficient condition*" for compliance with the requirements of the IPPCD, which also applies to this Installation. The IPPCD requires that emissions should be prevented or minimised, so it may be possible and desirable to achieve emissions below WID limits.

Even if the WID 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, WID limits is therefore a "worst-case" scenario.

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. The WID requires that the plant (furnace in this context) should be designed to deliver its requirements. The main requirements of the WID in relation to the choice of a furnace are compliance with air emission limits for CO and TOC and achieving a low TOC/LOI level in the bottom ash.

The Waste Incineration BREF elaborates the furnace selection criteria as:

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

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

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

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

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

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

In selecting the Moving Grate option, the Applicant comments that each option can achieve WID compliance, has broadly comparable performance and is broadly similar in its GWP. The Applicant's choice of moving grate is primarily based on its proven operation at commercial scales.

The Applicant has therefore proposed to use a furnace technology comprising an inclined reciprocating grate. Waste will be fed via a feed hopper and a set of feed rams onto the grate. Primary combustion air will be fed primarily from below. As the waste progresses along the grate, it will pass through drying combustion and burn out zones. The grate elements will be made from a high chromium steel and air cooled to keep the surface temperature below 400 º C. The residence time of the waste on the grate will be 45 to 60 minutes. Ash falling through and from the end of the grate is collected in an ash conveying system. The height of the furnace has been designed to achieve a 2 second residence time at a minimum temperature of 850 ºC.

Comparison of thermal treatment technologies

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Moving grate (air-cooled)	Low to medium heat values (LCV 5 – 16.5 GJ/t) Municipal and other heterogeneous solid wastes Can accept a proportion of sewage sludge and/or medical waste with municipal waste Applied at most modern MSW installations	1 to 50 t/h with most projects 5 to 30 t/h. Most industrial applications not below 2.5 or 3 t/h.	Widely proven at large scales. Robust Low maintenance cost Long operational history Can take heterogeneous wastes without special preparation	generally not suited to powders, liquids or materials that melt through the grate	TOC 0.5 % to 3 %	High capacity reduces specific cost per tonne of waste
Moving grate (liquid Cooled)	Same as air-cooled grates except: LCV 10 – 20 GJ/t	Same as air-cooled grates	As air-cooled grates but: higher heat value waste treatable better Combustion control possible.	As air-cooled grates but: risk of grate damaging leaks and higher complexity	TOC 0.5 % to 3 %	Slightly higher capital cost than air-cooled
Rotary Kiln	Can accept liquids and pastes, solid feeds more limited than grate (owing to refractory damage) often applied to hazardous Wastes	<10 t/h	Very well proven with broad range of wastes and good burn out even of HW	Throughputs lower than grates	TOC <3 %	Higher specific cost due to reduced capacity
Fluid bed - bubbling	Only finely divided consistent wastes. Limited use for raw MSW often applied to sludges	1 to 10 t/h	Good mixing Fly ashes of good leaching quality	Careful operation required to avoid clogging bed. Higher fly ash quantities.	TOC <3 %	FGT cost may be lower. Costs of waste preparation

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Fluid bed - circulating	Only finely divided consistent wastes. Limited use for raw MSW, often applied to sludges / RDF.	1 to 20 t/h most used above 10 t/h	Greater fuel flexibility than BFB Fly ashes of good leaching quality	Cyclone required to conserve bed material Higher fly ash quantities	TOC <3 %	FGT cost may be lower. Costs of preparation.
Oscillating furnace	MSW / heterogeneous wastes	1 – 10 t/h	Robust Low maintenance Long history Low NOX level Low LOI of bottom ash	Higher thermal loss than with grate furnace LCV under 15 GJ/t	TOC 0.5 – 3 %	Similar to other technologies
Pulsed hearth	Only higher CV waste (LCV >20 GJ/t) mainly used for clinical wastes	<7 t/h	can deal with liquids and powders	bed agitation may be lower	Dependent on waste type	Higher specific cost due to reduced capacity
Stepped and static hearths	Only higher CV waste (LCV >20 GJ/t) Mainly used for clinical wastes	No information	Can deal with liquids and powders	Bed agitation may be lower	Dependent on waste type	Higher specific cost due to reduced capacity
Spreader - stoker combustor	- RDF and other particle feeds poultry manure wood wastes	No information	- simple grate construction less sensitive to particle size than FB	only for well defined mono-streams	No information	No information

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Gasification - fixed bed	- mixed plastic wastes - other similar consistent streams - gasification less widely used/proven than incineration	1 to 20 t/h	-low leaching residue - good burnout if oxygen blown - syngas available -Reduced oxidation of recyclable metals	- limited waste feed - not full combustion - high skill level - tar in raw gas - less widely proven	- Low leaching bottom ash - good burnout with oxygen	High operation/ maintenance costs
Gasification - entrained flow	- mixed plastic wastes - other similar consistent streams - not suited to untreated MSW - gasification less widely used/proven than incineration	To 10 t/h	- low leaching slag - reduced oxidation of recyclable metals	- limited waste feed - not full combustion - high skill level - less widely proven	low leaching slag	High operation/ maintenance costs pre-treatment costs high
Gasification - fluid bed	- mixed plastic wastes - shredded MSW - shredder residues - sludges - metal rich wastes - other similar consistent streams - less widely used/proven than incineration	5 – 20 t/h	-temperatures e.g. for Al recovery - separation of non-combustibles -can be combined with ash melting - reduced oxidation of recyclable metals	-limited waste size (<30cm) - tar in raw gas - higher UHV raw gas - less widely proven	If Combined with ash melting chamber ash is vitrified	Lower than other gasifiers
Pyrolysis	- pre-treated MSW - high metal inert streams - shredder residues/plastics - pyrolysis is less widely used/proven than incineration	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	- no oxidation of metals - no combustion energy for metals/inert - in reactor acid neutralisation possible - syngas available	- limited wastes - process control and engineering critical - high skill req. - not widely proven - need market for syngas	- dependent on process temperature - residue produced requires further processing e.g. combustion	High pre-treatment, operation and capital costs

The permit contains a pre-operational measure (PO5) and an improvement condition (IC4) for the Operator to demonstrate compliance with the 850 ºC and 2 seconds residence time requirement in the WID.

The Applicant proposes to use low sulphur light fuel oil as a support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on ensuring that auxiliary fuel is always available. Natural gas is only available to the Applicant as an interruptible supply. The Applicant needs to be able to be sure that auxiliary fuel is always available in case the auxiliary burners are required to maintain the combustion temperature above 850 ºC, or to safely shut down the plant.

Ash falling the end of the grate falls directly into a water bath. The function of the water bath is both to quench the ash and to act as an air seal at the end of the incinerator to prevent the uncontrolled ingress of air. Ash is mechanically conveyed from the water bath, where it both drains and partially dries. Water which is drained from the ash is re-circulated to the water bath. Water vapour and odour from the ash is pulled through the incinerator as secondary air. The water bath is topped up with waste water from the boiler water feed, boiler blow down water and harvested rainwater.

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

Boiler Design

The plant control system will adjust the waste feed rate and the grate speed in order to maintain a constant heat load to the energy recovery system. The hot combustion gases first pass through a combination of water-cooled radiant chambers and evaporator screens to reduce the gas temperature to 650 ºC. The Applicant states that this is to minimise corrosion and to reduce the temperature below the melting point of any entrained particulate matter to prevent it adhering to heat transfer surfaces.

The boiler uses a six pass system. The super-heater, evaporator and economiser tube bundle systems are housed in a horizontal pass to minimise corrosion. The Application sets out a range of design features to prevent corrosion including the use of refractory lining at lower levels of the first pass, extensive use of Inconel cladding and a mechanical rapping system to prevent material build up. The combination of these feature enables the Applicant to produce steam at 60 bar and 420 ºC in comparison with 40 bar and 400 ºC commonly normally found in incineration plant.

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

- ensuring that the steam/metal heat transfer surface temperature is a minimum where the exhaust gases are within the de-novo synthesis range;

- design of the boilers using CFD to ensure no pockets of stagnant or low velocity gas;
- boiler passes are progressively decreased in volume so that the gas velocity increases through the boiler; and
- Design of boiler surfaces to prevent boundary layers of slow moving gas.

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

6.2 BAT and emissions control

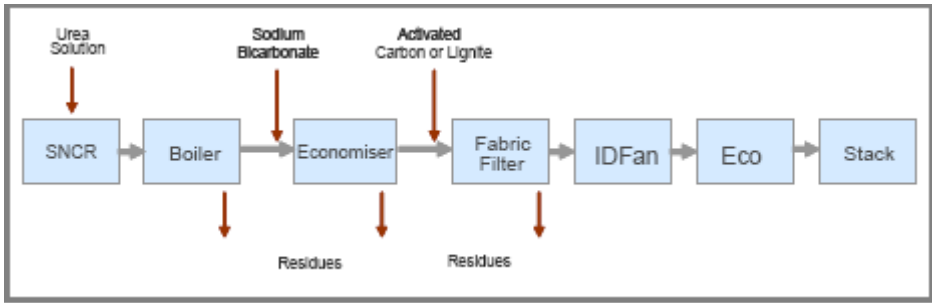
The prime function of flue gas treatment is to reduce the concentration of pollutants in the exhaust gas as far as practicable. The techniques which are described as BAT individually are targeted to remove specific pollutants, but the BREF notes that there is benefit from considering the flue gas treatment 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 systems as:

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

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

The Applicant's proposals for air pollution control can be summarised in the diagram below.



The first step in the process is NO_x removal using urea in a SNCR system. This is followed by energy recovery in the boiler. Sodium bicarbonate is used to remove acid gases; the activated carbon is to remove mercury and dioxins. The fabric filter removes both the powdered materials used in the abatement system and particulates from the combustion process, before it is released to atmosphere via the chimney stack. There are no dump stacks or bypasses on the system. In this section we consider whether the Applicant is proposing to apply the best available techniques for air pollution control.

6.2.1 Assessment of chimney height

The Applicant has assessed the impact of chimney height on emissions by predicting the maximum ground level concentration of NO_x from chimney heights between 45m and 120m at 5m increments. A graphical representation of this assessment is presented in the Application. Based on this assessment the Applicant has selected a chimney height of 95m, because this represents the point at which the benefits of further increasing the stack height become small.

It is noted that at an earlier stage in the development of this project (i.e. the bidding stage to the local waste partnership), a stack height of only 85m was proposed. This is however not relevant to this determination.

From the previous section, there are a number of pollutants that cannot be screened out as insignificant; however in no case is there a risk of exceeding an EAL as a result of emissions from the stack. Subject to its consideration of abatement techniques, the Environment Agency is satisfied that a 95m stack is BAT for this installation.

6.2.2 Carbon monoxide and volatile organic compounds (VOCs)

From our consideration of environmental impact, we concluded that emissions of VOCs could not be screened out as insignificant. However that emissions of VOCs were unlikely to result in the exceedence of any air quality standard. Therefore provided the Applicant's proposals for the control of VOCs were BAT, emissions would be at an acceptable level. Emissions of CO have been screened out as insignificant.

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. The

Applicant's proposals for optimising combustion control meet the requirements of the WID BREF and so are considered BAT.

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

6.2.3 Oxides of Nitrogen

From our consideration of environmental impact, we concluded that emissions of NO_x could not be screened out as insignificant. However that emissions of NO_x were unlikely to result in the exceedence of any air quality standard. Therefore provided the Applicant's proposals for the control of NO_x were BAT, emissions would be at an acceptable level. Available techniques for the control of emissions of NO_x are summarised in the tables below.

Oxides of Nitrogen : Primary Measures				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Low NO_x burners	Reduces NO_x 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 NO_x control. May increase overall energy recovery	Some applications experience corrosion problems.		All plant unless impractical in design (needs to be demonstrated)

The Applicant proposes to implement the following primary measures:

- Low NO_x burners – this technique reduces NO_x at source and is defined as BAT where auxiliary burners are required.
- Optimise primary and secondary air injection – this technique is BAT for all plant. The Applicant has provided details on its proposals for multiple injection of both primary and secondary air.
- Flue gas recirculation – this technique reduces the consumption of reagents for secondary NO_x control, although in some applications there can be corrosion problems. The Applicant proposes to re-

circulate flue gas from after the bag filter to minimise corrosion. The Operator comments that although FGR increases energy consumption of the incinerator plant by about 3%, it improves the overall thermal efficiency of the process.

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)	NO_x emissions < 70mg/ m^3 Reduces CO, VOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
Selective non-catalytic reduction (SNCR)	NOx emissions typically 150 - 180mg/m^3	Relies on an optimum temperature around 900 °C, and sufficient retention time for reduction May lead to Ammonia slip	Port injection location	All plant unless lower NOx release required for local environmental protection.
Reagent Type: Ammonia	Likely to be BAT Lower nitrous oxide formation	More difficult to handle Narrower temperature window		All plant
Reagent Type: Urea	Likely to be BAT			All plant

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

SCR can reduce NO_x levels to below 70 mg/m^3 and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which in turn reduces energy efficiency, and requires periodic replacement of the catalysts which also produces a hazardous waste. SNCR can typically reduce NO_x levels to between 150 and 180 mg/m^3; it relies on an optimum temperature of around 900 deg C and sufficient retention time for reduction. SNCR is more likely to have higher levels of ammonia slip. The technique can be applied to all plant unless lower NO_x releases are required for local environmental protection. Urea or ammonia can be used as the reagent with either technique, urea is somewhat easier to handle than ammonia and has a wider operating temperature window, but tends to result in higher emissions of N_2O. Either reagent is BAT, and the use of one over the other is not normally significant in environmental terms.

The Applicant proposes to use SNCR with urea as the reagent. The conditions for optimum use of SNCR already exist in the secondary combustion area. The Applicant proposes to inject a urea solution at two different levels within the combustion chamber.

The Applicant has made an assessment of the alternative techniques. This assessment is based on the Environment Agency's H1 tool and not by detailed modelling; hence the predictions may be different to those reported in section 5 of this document.

The Applicant indicates that SNCR will nominally achieve NO_x emissions of 160 mg/m^3 whereas SCR will achieve NO_x emissions of 100 mg/m^3. Note the WID limit of 200 mg/m^3 is the maximum permitted from the installation and in this context operating at 160 mg/m^3 is reasonable. The Environment Agency agrees that these are appropriate levels of reduction that can be achieved using these technologies.

The Applicant's assessment considers NH_3 and N_2O releases associated with NO_x abatement. The overall impact is summarised in the table below.

Options	NO_x (mg/m^3)	NH_3 (mg/m^3)	N_2O (mg/m^3)
SNCR with Urea	160	7	20
SNCR with Ammonia	160	10	10
SCR with Ammonia	100	5	2

This shows that in terms of direct emissions to the environment SCR is the most effective.

However there is an energy penalty with SCR. SCR operates at much lower temperatures than SNCR. Whereas SNCR is the first step in the flue gas treatment process, SCR would be the last. Even though SCR occurs at lower temperatures, because it is the last stage in the process, the exhaust gas is too cold by this point for the technique to be effective and so requires the exhaust gas to be reheated. This reduces the energy that can be recovered and increases the costs. SCR also has higher capital and running costs.

The Applicant has calculated the cost per tonne of NO_x abated over the projected life of the plant. This is shown in the table below:

	Cost £/year	Annual NO_x abated (tonnes)	Cost per tonne NO_x abated	PEC of NO_2 (% of EUSQS) (1)
SNCR with Urea	£0.244m	436	£560	40.64
SNCR with Ammonia	£0.337m	436	£773	40.64
SCR with Ammonia	£1.677m	513	£3,269	39.74

Note (1): The long term EUEQS for NO_2

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 from NO_2. Thus SCR is not BAT in this case, and SNCR is BAT for the Installation. The Environment Agency agrees with this assessment.

The Applicant has justified the use of urea as the reagent on the basis of lower reagent use (~16% in comparison with ammonia). The Applicant stated that urea gives slightly lower ammonia emissions, but recognises that N_2O emissions are increased.

The amount of urea used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH_3 slip. Improvement condition IC3 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system. The Operator is also required to monitor and report on NH_3 and N_2O emissions every 6 months.

6.2.4 Acid Gases, SO_2, HCl and HF

From our consideration of environmental impact, we concluded that emissions of SO_2 could not be screened out as insignificant. However that emissions of SO_2 were unlikely to result in the exceedence of any air quality standard. Therefore provided the Applicant's proposals for the control of SO_2 were BAT, emissions would be at an acceptable level. Emissions of HCl and HF have been screened out as insignificant. However techniques used to control SO_2 are also effective on HCl and HF, collectively they are referred to as acid gases.

Available techniques for the control of emissions of acid gases are summarised in the tables below.

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 SO_2 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

The Applicant proposes to implement the following primary measures:

- The Applicant proposes to use low sulphur fuel for use at start up, shut down and to maintain combustion temperature if required.
- Management of heterogeneous wastes – this will disperse problem wastes such as PVC by ensuring a homogeneous waste feed. Waste streams which can be burnt are set out in table S2.2 of the permit. The incinerator will however burn predominately residual municipal waste.

Acid gases and halogens : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Wet	High reaction rates Low solid residues production Reagent delivery may be optimised by concentration and flow rate	Large effluent disposal and water consumption if not fully treated for re-cycle Effluent treatment plant required May result in wet plume Energy required for effluent treatment and plume reheat		Plants with high acid gas and metal components in exhaust gas – HWIs
Dry	Low water use Reagent consumption may be reduced by recycling in plant Lower energy use Higher reliability	Higher solid residue production Reagent consumption controlled only by input rate		All plant
Semi-dry	Medium reaction rates Reagent delivery may be varied by concentration and input rate	Higher solid waste residues		All plant
Reagent Type: Sodium Hydroxide	Highest removal rates Low solid waste production	Corrosive material ETP sludge for disposal		HWIs
Reagent 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

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:**
Reagent Type: Sodium Bicarbonate	Good removal rates Easiest to handle Dry recycle systems proven	Efficient temperature range may be at upper end for use with bag filters – Leachable solid residues Bicarbonate more expensive	Not proven at large plant	CWIs

There are three recognised techniques for secondary measures to reduce acid gases. These are wet, dry and semi-dry scrubbing. The Applicant has carried out a BAT options appraisal on the above techniques. Four options have been considered and includes separate consideration of lime and sodium bicarbonate as the reagents in a dry scrubbing system.

Wet scrubbing produces an effluent for treatment and disposal in compliance with Article 8 of WID. It will also require reheat of the exhaust gas to avoid a visible plume. Wet scrubbing is unlikely to be BAT except where there are high acid gas and metal components in the unabated exhaust gas as may be the case for some hazardous waste incinerators. Both dry and semi-dry methods rely on the dosing of powdered materials into the exhaust gas stream. Semi-dry systems use a hydrated reagent and 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.

Although the Applicant has done its BAT options appraisal for all acid gases, we have only considered it against SO_2 because it has not been screened out as insignificant whereas HCl and HF have.

	Cost £/year	Annual SO_2 abated (tonnes)	Cost per tonne SO_2 abated	PEC of SO_2 (% of EAL) (1)
Dry Scrubber using Lime	£3.166m	449	£7,051	14.80
Dry Scrubber $NaHCO_3$	£2.959m	462	£6,405	14.68
Wet Scrubber	£5.199m	488	£10,654	14.45
Semi Dry Scrubber	£4.377m	449	£9,748	14.80

Note (1): The long term EAL for NO_2 of 50 mg/m^3

The above table shows that there is no significant difference in the PEC of SO_2 for any of the options. Dry scrubbing using sodium bicarbonate is the most cost effective method of acid gas abatement and is the one chosen by the Operator.

The optimum temperature for acid gas abatement is 200 to 240 ºC. Injection of sodium bicarbonate therefore takes place just after the boiler plant. The Applicant proposes to control the dosing rate through a control algorithm monitoring the SO_2 and HCl concentration in the flue gas upstream and downstream of the dosing system. The Applicant considers that sodium bicarbonate is more responsive to changing levels of acidity in the exhaust gas.

The Environment Agency is satisfied that this is BAT

6.2.5 Dioxins and furans (and Other POPs)

From our consideration of environmental impact, we concluded that emissions of dioxins and furans and of PCBs could be screened out as insignificant. However that emissions of PAHs could not be screened out as insignificant, but that emissions of PAHs were unlikely to result in the exceedence of any air quality standard.

Available techniques for the control of emissions of dioxins, furans and other POPs are summarised in the tables below.

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

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

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

- optimisation of combustion control including the maintenance of WID combustion conditions on temperature and residence time, which has been considered above;
- preventing material build up on the surfaces within the boiler section, which reduces the likelihood of de-novo synthesis;
- rapid cooling of the exhaust gases within the boiler section, which reduces the likelihood of de-novo synthesis;
- the effective removal of particulate matter from the flue gas, which is considered below;
- injection of activated carbon. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant. Effective control of acid gas emissions also assists in the control of dioxin releases.

The Applicant proposes to control the dosing rate of carbon to the flue gas flow rate. The Applicant states that the dosing rate will be nominally 0.74 Kg/tonne of waste. The dosing control mechanism will be determined during commissioning, with calibration against the emissions monitoring of mercury and dioxins.

In this case the Applicant proposes to control the feed of activated carbon separately from the control of sodium bicarbonate and we are satisfied their proposals are BAT.

Pre-operational condition PO6 requires the submission of a more detailed commissioning plan. Optimisation of dosing rates should be reported under improvement condition IC3.

6.2.6 Metals

From our consideration of environmental impact, we concluded that emissions of As, Cd, Pb, Mn, Cr(VI) and Ni could not be screened out as insignificant. However that emissions of these metals were unlikely to result in the exceedence of any air quality standard. Therefore provided the Applicant's proposals for the control of metals were BAT, emissions would be at an acceptable level. Emissions of all other metals subject to control under WID have been screened out as insignificant.

Metals				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Effective Particulate matter removal			Covered in section on particulate matter	All plant
Activated Carbon injection for mercury recovery	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.

The prevention and minimisation of metal emissions is achieved through the effective removal of particulate matter, and this is considered in the next section.

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

Activated carbon is added to the exhaust gas as described previously, and the dosing rate will be set to ensure the effective removal of mercury. We are therefore satisfied their proposals are BAT.

6.2.7 Particulate Matter

Available techniques for the control of particulate emissions are summarised in the table below.

Particulate Matter				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Bag / Fabric filters	Reliable abatement of particulate matter to below 5mg/m^3	Max temp 250°C	Multiple compartments Bag burst detectors	Most plants
Wet scrubbing	May reduce acid gases simultaneously.	Not normally BAT. Liquid effluent produced	Require reheat to prevent visible plume and dew point problems.	Where scrubbing required for other pollutants
Ceramic filters	High temperature applications Smaller plant.	May "blind" more than fabric filters		Small plant. High temperature gas cleaning required.
Electrostatic precipitators	Low pressure gradient. Use with BF may reduce the energy consumption of the induced draft fan.	Not normally BAT		When used with other particulate abatement plant

The Applicant proposes to use PTFE coated 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. As well as removing particulate matter arising from the combustion process, the bag filter also removes the sodium bicarbonate and activated carbon which has been dosed into the exhaust gas to abate other pollutants. The filter cake which forms on the surface of the bag filter also serves as a reaction medium for the further removal of these pollutants. 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.

The Applicant is proposing a 6 chamber filter, sized so that the filter can take the full load of the plant with one chamber isolated for inspection and maintenance.

The filter bags will be cleaned by a reverse jet technique, whereby a pulse of compressed air will be introduced to each filter bag. This causes the filter cake to break loose and drop into the hopper below. From here the filter cake

is conveyed in a closed system to the APC residue storage silos. A proportion of the APC residue is recycled to optimise reagent use.

In their BAT options appraisal, the Applicant has compared bag filter and ceramic filter and concluded bag filter is superior for all parameters considered.

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

6.3 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 IPPCD purposes.

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

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

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

Taking this into account, the net emissions of CO_2 from the installation are estimated at 108,930 tonnes per annum. At this level emissions cannot be characterised as insignificant. The Installation is not subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2003; therefore it is a requirement of IPPCD to investigate how emissions of greenhouse gases emitted from the installation might be prevented or minimised.

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

On the debit side

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

The plant will burn 245,000 tpa of waste and produce 58,800 tpa of bottom ash. The Applicant has assumed that the carbon content of the waste is 25% and that the carbon content of the ash is 3%. This means a net carbon content of 59,486 tonnes resulting in a total CO_2 release of 218,115 tonnes per annum. Overall the emissions of CO_2 are estimated as follows:-

Burning of Waste	218,115
Burning of Auxiliary Fuel	1,211
Electricity Imported from the Grid	208
Nitrous Oxide (CO_2 equivalent)	7,954
Total	227,486

On the credit side

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

Electricity Exported	- 96,168
Steam Exported	- 22,390
Total	-118,558

The net GWP is therefore 108,930 tonnes, which is equivalent to 0.44 tonnes of CO_2 per tonne of waste incinerated. .

The Applicant's assessment shows that the GWP of the plant is dominated by the emissions of carbon dioxide that are released as a result of waste combustion. The BREF quotes a range of 0.7 to 1.7 tonnes of CO_2 per tonne of municipal waste. The performance of the plant is therefore better than that in the BREF, which is due to the high level of energy recovery.

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

6.4 <u>BAT and POPs</u>

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

the EC POPs Regulation when determining applications for environmental Permits.

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

The unintentionally-produced POPs addressed by the Convention are:

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

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

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

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

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

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

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

We believe that the Permit ensures that the formation and release of POPs will be prevented or minimised. As we explain above, high-temperature incineration is one of the prescribed methods for destroying POP's. Permit conditions are based on the use of BAT and WID 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 WID to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. EPR requires that, in addition to the requirements of the WID, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be specified for monitoring and reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. EPR requires monitoring of a range of PAHs and dioxin-like PCBs in waste incineration Permits at the same frequency as dioxins are monitored. We have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like PCBs and the range of PAHs identified by Defra in the Environmental Permitting Guidance on the WID. We are confident that the measures taken to control the release of dioxins will also control the releases of dioxin-like PCBs and PAHs. Sections 5.2 to 5.5 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.

Hexachlorobenzene (HCB) is released into the atmosphere as an accidental product from the combustion of coal, waste incineration and certain metal processes. It has also been used as a fungicide, especially for seed treatment

although this use has been banned in the UK since 1975. Natural fires and volcanoes may serve as natural sources. Releases of (HCB) are addressed by the European Environment Agency (EEA), which advises that:

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

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

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

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

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

Emissions to water will be limited to uncontaminated surface water run off. This will discharge into the tidal estuary of the river Tamar. The Applicant has stated that rain water will be harvested and used for irrigation purposes. Discharges to water will therefore only comprise excess surface water which is either not harvested or overflows from the harvesting system.

The discharge point will be located such that it is above the maximum water tidal level. The discharge will be fitted with a petrol interceptor and emergency cut off valve to prevent accidental spillages reaching the estuary.

Waste process water which comprises boiler blowdown, boiler water, waste water from the demineralisation plant will be used for bottom ash quenching and under normal operating conditions there will be no waste water generated at the installation. Excess process effluent will be discharged to sewer not to water.

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

The Applicant has demonstrated that in the event of a fire at the installation, there is sufficient retention capacity for contaminated fire fighting water to ensure that there is no uncontrolled release of the contaminated fire fighting water to the river, estuary or sewer.

The use of an air cooling system means there is no abstraction of cooling water from the estuary or discharge of warm water to the estuary.

In our consultation response to the local planning authority, we commented that we believed the routing surface water direct to the creek was not the most suitable option and instead it should be allowed to form a wetland around the northern corner of the site and infiltrate into the creek. This is not a relevant consideration for our permitting decision. We also made comments regarding general water course improvements, again these are not relevant to our considerations under the Environmental Permitting Regulations, and are matters for the local planning authority.

6.5.2 Emissions to sewer

There will be a connection made from the installation to the foul sewer. There will be no routine discharge of process water from the site during normal plant operations. Waste water arising from the welfare and sanitation needs of the workforce will be discharged to sewer.

During periods of high steam take off to the dockyard and consequential loss of condensate. There may be a need to discharge some waste water from the boiler feed water treatment plant. A waste water neutralisation tank will be used to ensure that any waste water meets the requirements of the foul sewer discharge consent. Alternatively waste water can be tankered offsite for safe disposal. In the event that waste water is tankered offsite, the quantity and pH will be measured.

In the event of fire at the installation, any fire fighting water would be retained within the appropriate building. The water would be sampled and sent either to sewer or for safe offsite disposal based on the results of the analysis.

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

6.5.3 Fugitive emissions

The Applicant has provided a risk assessment and management plan for fugitive emissions, which the Environment Agency considers to be satisfactory and should ensure compliance with permit conditions, specifically condition 3.2.

The facility includes a back up diesel generator to provide electrical power to safely shut down the incinerator in the event of the non availability of electrical power. The back up generator also powers the fire fighting systems. Emissions from the back up generator are considered insignificant.

Each storage silo used for sodium bicarbonate, activated carbon and APC residues is fitted with filters to prevent fugitive releases from pneumatic conveyors.

The WID 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 contaminated water of Article 8(7) must be arranged.

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

6.5.4 Odour

The building ventilation system draws air from the tipping hall, waste bunker and bale store areas for use as part of the combustion air in the incineration plant. In this way any odour contained within the ventilation air will be destroyed. Plant shut down is when waste is likely to be stored longest and when odour is most likely to arise. During shut down periods the air is drawn through a filtering unit to minimise odour emissions. The Applicant's modelling of odour during these periods is summarised in section 5.7.1.

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

The Applicant has included an odour management plan as part of their Application which the Environment Agency considers satisfactory. This has been incorporated as part of the installation's operating techniques in table S1.2 of the permit.

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.

6.5.5 Noise and vibration

Based upon the information in the application, which has been considered in section 5.6.4; 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.

Pre-operational condition (PO7) and improvement condition (IC8) have been included to ensure the installation is built in accordance with the standards applied in the noise model and that the noise impact from the installation is in line with the model predictions. Noise is more generally controlled through conditions 3.5.1 and 3.5.2. In the event that for any reason noise does result in nuisance or annoyance, further measures can be sought using permit condition 3.5.2.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

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

Below we consider whether, for those emission not screened out as insignificant, different conditions are required as a result of consideration of local or other factors.

We have reviewed the Applicant's assessment of environmental impact and are satisfied that there will not be significant pollution or risk to human health arising from the operation of the incinerator by the local community.

However, local residents have expressed concern about the proposed location of the incinerator, the local terrain and localised weather conditions. We have carefully considered these factors in our audit of the Applicants' air dispersion modelling and have carried out our own modelling using Met Office Numerical Weather Predictions. Our check modelling indicates some differences, but not sufficient to change the conclusions.

Emissions of NO_x do not screen out as insignificant. However the worst case projection is that the incinerator should not increase the ambient NO_2 levels by more than 2.5% of the EUEQS and that the Predicted Environmental Concentration will be less than half the EUEQS.

The highest values of PEC (as a % of the EAL) are for Cr(VI) at 55% and PAH at 32.5%. Neither of these emissions are directly controlled by WID, and emissions of Cr(VI) will be at levels difficult to detect in the exhaust. We are satisfied that compliance with the ELV for dioxins will also ensure that PAHs emissions are minimised. The total chromium emission from the incinerator will be monitored and reported, in the event that the results of this monitoring show unexpectedly high levels of chromium emissions, tighter controls can be considered.

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 the IPPCD or under WID, e.g. it is not included in Annex III to the IPPCD, which lists the main polluting substances that are to be considered when setting emission limit values (ELVs) in Permits.

We have 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.

6.6.2 Commissioning

The Applicant has provided an outline commissioning plan; it envisages three stages of operation:

- Cold commissioning
- Hot commissioning
- Trial operation period

Cold commissioning is that testing of the functionality of the plant that can be carried out without applying any heat. Hot commissioning is the testing of the functionality of the plant that does require heat. As much of this testing will be carried out without burning waste, this will include the completion of what are described as readiness tests. Waste will not be burnt until the satisfactory completion of the readiness tests. This will lead on to the completion of a set of acceptance tests. Satisfactory completion of the acceptance tests concludes the hot commissioning stage and denotes the end of the commissioning phase.

There will then follow a 28 period of trial operation. This will include carrying out a series of operations to test the full capabilities of the plant.

The purpose of commissioning is to establish that the installation is able to operate as designed. During the commissioning it is necessary to push the plant to its operational limits. It is possible that during commissioning non compliances with the specifications are identified and corrective actions required.

The conditions set out in the permit that control the day to day operation of the installation and its emissions come into effect from the point that waste is first burnt. This will be during the commissioning phase following the completion of the readiness tests.

A pre-operational condition (PO6) is therefore included which requires the Operator to specify further details on their commissioning plan including what

further controls will be required in particular to control emissions to air during this period.

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 abatement system; to deliver the EPR requirement that dioxin-like PCBs and PAHs should be monitored and to deliver the requirements of WID for monitoring of residues and temperature in the combustion chamber.

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

Monitoring of emissions to sewer shall be limited to flow, pH and temperature. Emissions to sewer will be subject to a separate discharge consent issued by the sewerage undertaker. The pH of the discharge to sewer is subject to an ELV to prevent acid or alkaline discharges to sewer.

There is currently no emission limit prescribed nor any continuous emissions monitor for particulate matter specifically in the PM_{10} or $PM_{2.5}$ fraction. 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.

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

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

The Operator will 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 WID abnormal operating conditions apply. The Applicant has not proposed any alternative means of measuring CO, TOC or particulate matter. Therefore if both the operational and back up CEMs fail for any of these parameters, the plant will need to shut down.

Continuous monitoring will apply to NO_x, particulate matter, SO_2, HCl, CO and VOCs. The monitoring of all other parameters will be by periodic extractive monitoring. The Operator has not proposed monitoring for NH_3 or N_2O. However this will need to be included to monitor the performance of the SNCR system, periodic monitoring will be sufficient for this purpose.

6.7.3 Continuous emissions monitoring for dioxins and mercury

The WID specifies manual extractive sampling for mercury and dioxin monitoring. However, Article 11(13) of the WID requires that "The Commission, acting in accordance with the procedure laid down in Article 17, shall decide, as soon as appropriate measurement techniques are available within the Community, the date from which continuous measurements of the air emission limit values for heavy metals, dioxins and furans shall be carried out in accordance with Annex III". No such decision has yet been made by the Commission.

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

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

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

use of BS EN 1948 and the manual sampling method remains the only acceptable way to monitor dioxins for the purpose of regulation.

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

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

6.8 Reporting

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

7 Other legal requirements

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

7.1 The EPR 2010 and related Directives

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

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

We address the requirements of the IPPCD in the body of this document above.

There is one requirement not addressed above, which is that contained in Article 9(2) IPPCD. Article 9(2) of the IPPC Directive requires that "In the case of a new installation or a substantial change where Article 4 of Directive 85/337/EC applies, any relevant information obtained or conclusion arrived at pursuant to articles 5, 6 and 7 of that Directive shall be taken into account for the purposes of granting an environmental 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 take into consideration any relevant information obtained or conclusion arrived at by the local planning authorities pursuant to those EIA Directive articles.

At the time of writing the draft permit and decision document, a decision on the grant or refusal of planning permission has not been taken. However at its meeting on 22nd December 2011, the Plymouth City Council Planning Committee decided to grant planning permission.

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 Plymouth City Council Planning Authority to grant planning permission on 22nd December 2011.
- The response of the Environment Agency to Plymouth City Council in its role as consultee to the planning process.

From consideration of all the documents above, we are satisfied that no additional or different permit conditions are necessary.

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

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

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

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

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

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

Article 13 relates to the protection of human health and the environment. These objectives are addressed elsewhere in this document, in particular in section 5.3.

Article 23(1) requires the permit to specify:

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

These are all covered by permit conditions.

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

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

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

7.1.3 Schedule 13 to the EPR 2010 – **Waste Incineration Directive**

We address the WID in detail in Annex 1 to this document.

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

To the extent that it might lead to a discharge of pollutants to groundwater (a "groundwater activity" under the EPR 2010), the Permit is subject to the requirements of Schedule 22, which delivers the requirements of EU Directives relating to pollution of groundwater. The Permit will require the

taking of all necessary measures to prevent the input of any hazardous substances to groundwater, and to limit the input of non-hazardous pollutants into groundwater so as to ensure such pollutants do not cause pollution, and satisfies the requirements of Schedule 22.

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

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

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

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

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

7.2 National primary legislation

7.2.1 **Environment Act 1995**

(i) Section 4 (Pursuit of Sustainable Development)

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

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

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

(ii) Section 7 (Pursuit of Conservation Objectives)

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

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

(iii) Section 81 (National Air Quality Strategy)

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

7.2.2 **Human Rights Act 1998**

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

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

Section 85 of this Act imposes a duty on Environment Agency to have regard to the purpose of conserving and enhancing the natural beauty of areas of outstanding natural beauty (AONB).

Areas around the installation site are designated as AONB; these include parts of Cornwall, the Tamar Valley and the South Devon coastline, which is also designated as a Heritage Coastline.

The installation is located within the Plymouth urban area. The environmental impact of the installation has been considered within section 5 of this document, including its impact on conservation features. The assessment shows that there will be no significant impact on these features. Therefore it is considered unlikely that the installation will impact on those features which underpin the designation of these areas of outstanding natural beauty.

7.2.4 **Wildlife and Countryside Act 1981**

Under section 28G of the Wildlife and Countryside Act 1981 the Environment Agency has a duty to take reasonable steps to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which a site is of special scientific interest. Under section 28I the

Environment Agency has a duty to consult Natural England in relation to any permit that is likely to damage SSSIs.

We assessed the Application and concluded that the Installation will not damage the special features of any SSSI. The Tamar-Tavy Estuary SSSI also forms part of the Tamar Estuaries SAC and the impact has been considered as part of our assessment of Habitat sites. We have informed Natural England of the conclusions, through the completion of an Appendix 11 assessment. We have received no representations from Natural England that they have any concerns arising from the Appendix 11 assessment.

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

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

7.3 National secondary legislation

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

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

We have informed Natural England of our conclusions by means of an Appendix 11 assessment, which we sent to them on 6th December 2011. We have received no representations from Natural England that they have any concerns arising from the Appendix 11 assessment. The habitat assessment is summarised in greater detail in section 5.4 of this document. A copy of the full Appendix 11 Assessment can be found on the public register.

7.3.2 **Water Framework Directive Regulations 2003**

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

7.3.3 **The Persistent Organic Pollutants Regulations 2007**

We have explained our approach to these Regulations, which give effect to the Stockholm Convention on POPs and the EU's POPs Regulation, in section 6.4 above.

7.4 Other relevant EU legislation

7.4.1 Industrial Emissions Directive (2010/75/EU)

The IED replaces and integrates 7 separate European Directives into one consolidated document. This includes both the Waste Incineration Directive (2000/76/EC) and Integrated Pollution Prevention and Control Directive (2008/1/EC).

The UK enabling legislation has not yet been enacted. However the Directive will come into force for all new installations from 7th January 2013, it is unlikely that the installation will be operational before this time.

The 'BAT Conclusions' for incinerators, which are referenced in the IED are unlikely to be published before 2015. In the event that the BAT Conclusions document require changes to the permit conditions, the Environment Agency will vary the permit appropriately within a period of 4 years from the publication of the BAT Conclusions.

Until such time the conditions in this permit will apply.

7.5 Other relevant legal requirements

7.5.1 Duty to Involve

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

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

ANNEX 1 : APPLICATION OF THE WASTE INCINERATION DIRECTIVE

WID Article	Requirement	Delivered by
4(3)	measurement techniques for emissions into the air comply with Annex III	See below on compliance with Article 11
4(4)	compliance with any applicable requirement of directives on: Urban Waste Water Treatment, the IPPC, Air Quality Framework, Dangerous Substances, Landfill.	Landfill Directive is not relevant to this installation. Relevant requirements of all other directives are delivered via EPR.
4(4)(a)	list explicitly the categories of waste that may be treated; using the European Waste Catalogue ("EWC") including information on the quantity of waste where appropriate.	Condition 2.3.3 and Table S2.2 in Schedule 2 of the Permit.
4(4)(b)	Permit shall include the total waste incinerating capacity of the plant	Condition 2.3.3 and Table S2.2 in Schedule 2
4(4)(c)	Specify the sampling and measurement procedures used to satisfy the obligations imposed for periodic measurements of each air and water pollutant.	Conditions 3.3.1 and Tables S3.1, S3.1(a), S3.2, S3.3 and S3.4. also compliance with Articles 10 and 11
5(1)	Take all necessary precautions concerning delivery and reception of wastes, to prevent or minimise pollution.	EPR requires prevention and minimisation of pollution. Conditions 2.3.1 to 2.3.12, 3.2, 3.4 and 3.5.
5(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Part of the waste acceptance procedure – pre-operational measure PO3.
6(1)	(a). Slag and bottom ash to have Total Organic Carbon (TOC) is < 3% or loss on ignition (LOI) is < 5%. (b) flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber. (c) At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil, liquefied gas or natural gas	(a) Conditions 3.3.1 and Table S3.4. (b) - Pre-operational condition PO5. (c) Condition 2.3.7 – gas oil will be used.

WID Article	Requirement	Delivered by
6(2)	Relates to co-incineration plants	Not relevant
6(3)	Automatic waste feed prevention: (a) at start up until the specified temperature has been reached or if this temperature is not maintained (b) when the CEMs show that ELVs are exceeded due to disturbances or failure of abatement.	Conditions 2.3.6 and 2.3.7
6(4)	Different conditions than those in 6(1) may be authorised	No such conditions Have been allowed
6(5)	Emissions to air do not give rise to significant ground level pollution, in particular, through exhaust of gases through a stack	Emissions and their ground-level impacts are discussed in the body of this document
6(6)	Any heat generated from the process shall be recovered as far as practicable.	The plant will generate electricity and supply steam. Condition 1.2.1 and improvement condition IC2.
6(7)	Relates to the feeding of infectious clinical waste into the furnace	No infectious clinical waste will be burnt
6(8)	Management of the Installation to be in the hands of a natural person who is competent to manage it	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit fulfil this requirement
7(1)	Incineration plants to comply with the ELVs in Annex V.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a
7(2)	Relates to co-incineration	Not relevant
7(3)	Measured ELVs to be standardised in accordance with Article 11.	Schedule 6 details this standardisation requirement
7(4)	Relates to co-incineration	Not relevant
8(1) – 8(6)	All relate to conditions for water discharges from the cleaning of exhaust gases	There are no such discharges as condition 3.1.1 prohibits this.
8(7)	(a) prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. (b) storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting	The application explains the measures that will be in place for achieving the directive requirements.

WID Article	Requirement	Delivered by
9	(a) residues to be minimised in their amount and harmfulness, and recycled where appropriate (b) prevent dispersal of dry residues and dust during transport and storage (c) test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction)	(a) condition 1.4.1 (b) conditions 1.4.1 and 3.2.1 (c) condition 3.3.1 and Table S3.4
10(1) and 10(2)	Measurement equipment shall be installed and techniques used to monitor the incineration process, and that the measurement requirements shall be laid down in Permits	Condition 3.3.1 and tables S3.1 and S3.1(a), emissions to air, and table S3.3, process monitoring requirements
10(3)	Installation and functioning of CEMs for emissions to air and water to be subjected to regular control, testing and calibration	Condition 3.3.3, and tables S3.1, S3.1(a), S3.2 and S3.3
10(4)	Sampling points to be specified in Permits	Tables S3.1 and S3.1(a), S3.2 and S3.3
10(5)	Periodic measurements to air and water to comply with Annex III, points 1 and 2	Tables S3.1 and S3.3 specify the standards to be used.
11(2)	Continuous measurement of NO_x, CO, total dust, TOC, HCl, and SO_2 and periodic measurement of HF, heavy metals, dioxins and furans plus the measurement of combustion chamber temperature and concentration of O_2, pressure, temperature and water content of the exhaust gases	Condition 3.3.1 and tables S3.1, S3.1(a) and S3.3.
11(3)	Verify the residence time and minimum temperature as well as oxygen content of exhaust gases	Pre-operational condition PO5 in table S1.4.
11(4)	Periodic rather than Continuous measurement of HF if HCl is abated and limit values not exceeded	Condition 3.1.2 and table S3.1
11(6)	Conditional option of periodic measurement for HCl, HF and SO_2 instead of CEMs	Option not applied except for HF as per Article 11(4) above
11(7)	Reduction in the monitoring frequency for heavy metals, dioxins and furans under certain conditions,	Not applied as no such criteria available

WID Article	Requirement	Delivered by
	provided the criteria in article 17 of WID are available	
11(8)	Sets out reference conditions for standardisation of measurements	Schedule 6 sets the same reference conditions
11(9)	Recording and reporting requirements	Section 4 and Schedules 4 and 5
11(10)	Sets out criteria for compliance with ELVs in Annex V	Conditions 3.1.2 and tables S3.1, S3.1(a) and S3.3
11(11)	Specifies when ELVs apply, how averages are calculated (including the use of Annex III) and how many values can be discarded	Condition 3.3.5
11(12)	Average values for HCl, SO_2 and HF to be determined as per Articles 10(2), 10(4) and Annex III	See Articles 10(2), 10(4) and 11(11) above
11(14) to 11(16)	addresses the monitoring of waste water from the cleaning of exhaust gases	There are no such releases from the Installation.
11(17)	Competent authorities to be informed if ELVs are exceeded	Condition 4.3.1
12(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2
13(1)	Specify maximum period of unavoidable stoppages, disturbances or failures of purification or CEMs, during which air or water ELVs may be exceeded	Conditions 2.3.8 to 2.311
13(2)	Cease the feed of waste in the event of a breakdown	Condition 2.3.10
13(3)	Limits the maximum period under 13(1) above to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year	Condition 2.3.10.
13(4)	Limits on dust (150 mg/m^3), CO and TOC not to be exceeded	Condition 2.3.6 and Table S3.1(a)

ANNEX 2: Pre-Operational Conditions

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

Reference	Pre-operational measures
PO1	Prior to the commencement of commissioning, the Operator shall send an updated summary of the site Environment Management System (EMS) to the Environment Agency and make available for inspection all documents and procedures which form part of the EMS, together with a list of amendments made from the Application.
PO2	Prior to the commencement of commissioning, the Operator shall include within their emergency plan, a procedure for the safe shut down of the incinerator plant as a result of an external incident at the naval dockyard. This plan shall form part of the EMS documentation made available for inspection under pre-operational measure PO1.
PO3	Prior to the commencement of commissioning, the Operator shall submit a written report to the Environment Agency detailing the waste acceptance procedure to be used at the site. The waste acceptance procedure shall describe the process and systems to demonstrate how compliance with condition 2.3.5 will be achieved. The waste acceptance procedure will also include a procedure for describing the quantity, content and origin of any waste received which is assigned the waste code 20 01 99 or 20 03 99. The waste acceptance procedure shall form part of the EMS documentation made available for inspection under pre-operational measure PO1.
PO4	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency for approval a protocol for the sampling and testing of incinerator bottom ash for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.
PO5	After completion of furnace design and at least three calendar months before any furnace operation; the operator shall submit a written report to the Agency of the details of the computational fluid dynamic (CFD) modelling. The report shall demonstrate whether the design combustion conditions comply with the residence time and temperature requirements as defined by the Waste Incineration Directive.
PO6	Prior to the commencement of commissioning; the Operator shall provide further written details of their 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.
PO7	On completion of the final design of the installation, the Operator shall revise the Noise Assessment submitted in Appendix E – Noise Impact Assessment of the Application and re-submit the assessment to the Environment Agency. The revised assessment shall include the final design details for building, plant and equipment with respect to noise attenuation and shall demonstrate a level of performance at least as good as that shown in the Application.

ANNEX 3: Improvement Conditions

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

Reference	Improvement measure	Completion date
IC1	The Operator shall submit a written report to the Environment Agency on the implementation of its Environmental Management System and the progress made in the accreditation of the system by an external body or if appropriate submit a schedule by which the EMS will be subject to accreditation.	Within 18 months of the date on which waste is first burnt.
IC2	The Operator shall carry out the first review of energy recovery and efficiency required by condition 1.2.1 (b) after 2 years. That review shall include but not be limited to consideration of extending steam supply to the South Yard, and the establishment of a district heating system for neighbouring residential areas.	Within 2 years of the date on which waste is first burnt.
IC3	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of the flue gas abatement systems. The report shall provide details of : (i) combustion settings and the operation of the Selective Non Catalytic Reduction (SNCR) system to minimise oxides of nitrogen (NO_x) emissions within the emission limit values described in this permit with the minimisation of ammonia and nitrous oxide emissions. This shall include an assessment of the level of NO_x and N_2O emissions that can be achieved under optimum operating conditions. (ii) the optimisation (including dosing rates of sodium bicarbonate and activated carbon) for the control of acid gases and dioxins and furans.	Within 4 months of the date on which waste is first burnt.
IC4	The Operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the exhaust gases in the furnace whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency.	Within 4 months of the date on which waste is first burnt.
IC5	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions.	Within 4 months of the date on which waste is first burnt.

Reference	Improvement measure	Completion date
IC6	The Operator shall submit a written summary report to the Agency to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3. (i) Initial calibration report to be submitted to the Agency (ii) Full summary evidence compliance report to be submitted to the Agency	(i) Within 4 months of the date on which waste is first burnt. (ii) Within 18 months of the date on which waste is first burnt.
IC7	The Operator shall carry out the first review of techniques for the avoidance, recovery or disposal of wastes produced at the installation, required by condition 1.4.2, after 2 years. That review shall include but not be limited to consideration of recovery and recycling options for the treatment of air pollution control residues.	Within 2 years of the date on which waste is first burnt.
IC8	The Operator shall carry out a review of the noise impact of the installation at the most sensitive receptors, once the plant is fully operational in its first year of operation. The scope of the review shall be agreed with the Environment Agency and shall compare the actual noise emissions from the installation and their impact with those predicted in the Application. The review shall include appropriate measurements to verify any modelling work undertaken and establish whether any of the noise emissions have a tonal quality (both during daytime and night time operation) likely to give rise to nuisance or complaint. A report on the review shall be provided to the Environment Agency.	Within 12 months of the date on which waste is first burnt.

ANNEX 4: Consultation Reponses

A) Advertising and Consultation on the Application

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

The Application was advertised on the Environment Agency website. We also placed advertisements in the Plymouth Herald and Western Morning News on 6th July 2011. Copies of the Application were placed on the Environment Agency Public Register in Exeter and the Plymouth City Council Public Register. Additionally copies of the Application were placed at all local libraries in the Plymouth area.

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

- Cornwall County Council
- Devon County Council
- Foods Standards Agency
- Health and Safety Executive
- Health Protection Agency
- Natural England
- Plymouth City Council
- Plymouth NHS
- Queen's Harbour Master Plymouth
- Saltash Town Council
- South West Water
- Tamar Estuaries Forum
- Torpoint Town Council

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 public drop in event was held at the Community Centre in Barne Barton on July 20th 2011. Over 150 people attended of whom 125 signed into the visitors book.

Consultation responses received are summarised in the section below. Alongside each consultation response, we comment on any action taken or how and where this has been addressed in our decision making process.

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from Plymouth Teaching Primary Care Trust	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Plymouth NHS have provided background data on the current "health outcomes" for local people. These show significantly poorer health in the local neighbourhoods than the city average. As a result Plymouth NHS ask the following questions in their consultation response.	
Asks that the Environment Agency considers whether the air dispersion modelling data and outcomes contained in the Application are valid for such a vulnerable population as the four neighbourhoods near the proposed incinerator.	The modelling data is used to inform an assessment of the environmental and health impacts of the installation. The Environment Agency has audited the model and found that its predictions are soundly based. The subsequent impact assessment uses environmental quality standards, objectives and targets that are drawn from a range of sources including EU and UK legislation and guidance and WHO guidance to be protective of public health. The modelling does not predict the exceedence of any of these standards on any neighbourhood.
Asks the Environment Agency to ensure that in the event that a permit is granted, monitoring regimes are sufficiently robust to demonstrate the accuracy and appropriateness of the air dispersion modelling.	The modelling generally makes the assumption that emissions are at the maximum levels permitted by the Waste Incineration Directive, 100% of the time. This is a worst case assumption as operating in this mode would give no margin for error and inevitably result in breaches of emission limit values. The permit ensures that all emission limit values are enforced through rigorous regime of emissions monitoring at source. The permit includes both continuous and periodic monitoring. This monitoring regime is require to achieve the MCERTS standard with appropriate accreditation documentation.
Asks the Environment Agency to consider whether 5 years weather data is sufficient for air dispersion	The Environment Agency considers 5 years to be sufficient. In its check modelling of the data, the

Response Received from Plymouth Teaching Primary Care Trust	
modelling on a facility that will be in operation for 25 years or more.	Environment Agency looked at weather data from 2003 to 2007 (the Applicant used 2005 to 2009) and found little difference in predictions.
Asks the Environment Agency whether the emissions modelling data takes suitable account of the topography around the site.	The Applicant's model does take into account the terrain / topography of the site. The Environment Agency has assessed the model and is satisfied that the stack is of sufficient height to ensure adequate dispersion of pollutants.
Asks the Environment Agency whether NO_2 and PM_{10} emissions from vehicle movements on site have been appropriately considered.	Emissions from on site vehicle movements will be highly localised within the installation and are not expected to have any significant effect beyond the site boundary.
Asks the Environment Agency whether it is appropriate or not to apply a +5dB(A) correction to the night time noise levels at the site.	The Environment Agency is satisfied that provided the incinerator is built as specified a tonal penalty for night time noise is not required. Conditions have been included in the permit to confirm through measurement the absence of a tonal quality to any noise from the installation. In the unlikely event it was necessary, further measures could be taken.
Asks the Environment Agency to take account of the proximity of the facility to local residences and its impact on their wellbeing.	In the context of Environmental Law, pollution is defined as any emission as a result of human activity which may be harmful to human health or the quality of the environment, cause offence to a human sense, result in damage to material property, or impair or interfere with amenities or other legitimate uses of the environment. In so far as pollution from the incinerator could impact on the wellbeing of local residences, the Environment Agency is satisfied that human health and the environment is protected.

Plymouth NHS has additionally provided the Environment Agency with a copy of the health impact assessment "A rapid prospective 'desk-top' health impact assessment" submitted to Plymouth City Council planning authority. The study has categorised impacts as being positive or negative against criteria

based on 5 values of democracy, equity, sustainable development, ethical use of evidence and the promotion of health and equality.

Of particular relevance to this determination are the assessments observations on:

- Air Quality, Noise and Neighbourhood Amenity;
- Access to Healthy Food;
- Resource Minimisation; and
- Climate Change

The impact from emissions to air and from noise have been assessed in detail in the application. This information has been given detailed scrutiny by the Environment Agency during this determination process. We are satisfied that emissions to air will not give rise to an exceedence of any air quality standards. We are also satisfied that noise from the installation should not be at levels likely to give rise to nuisance or complaint. The Operator's compliance with the permit conditions will ensure that this position is maintained. Therefore in so far as air quality and noise can impact on public health and on neighbourhood amenity, we are satisfied that the applicant's proposals provide appropriate prevention and mitigation of any potential adverse effects.

Other aspects which could impact on neighbourhood amenity such as visual impact and impact on traffic movements are matters for the local planning authority and do not form part of our assessment.

The application also considers the potential impact on locally grown food from the deposition of dioxins and furans onto land. This is reported in section 5.3 of this document and indicates that the incinerator will contribute less than 1% of the UK tolerable daily intake of these substances, this is not considered significant.

The incinerator will for the most part treat residual municipal waste, i.e. that portion of waste collected from households which has not been recycled. The permit constrains the burning of materials that have been separately collected for recycling to circumstances where the level of contamination is such that the waste would otherwise be landfilled. Other resources used are for the treatment of combustion gases to prevent and minimise pollution, and permit conditions require that these are optimised.

The incinerator will also operate with a high level of energy recovery. The GWP of the incinerator has been calculated at 0.44 tonnes of CO_2 per tonne of waste, which is significantly lower than indicative levels of performance set out in the incineration BREF.

The Environment Agency is satisfied that the Applicants proposals for resource minimisation and climate change are BAT for the installation.

Response Received from Plymouth City Council	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Request that the Environment Agency's draft decision is made available to the City Council prior to it reaching its own decision on whether or not to grant planning permission.	In this case, the Environment Agency is able to meet this request.
Confirms that it will in making its planning decision work on the basis that the relevant pollution control regimes will be properly applied and enforced.	This is noted.
Draws the Environment Agency's attention to the fact that the City Council has declared a number of Air Quality Management Areas at Exeter Road, Mutley Plain, Tavistock Road, Royal Parade and Molesworth Road, Stoke; and asks that the impact of the proposed site on these areas be considered.	The Environment Agency has looked at the impact of the incinerator on these Air Quality Management Areas and can confirm that in all cases, all emissions can be considered insignificant in that they give rise to a process contribution of less than 1% of the Environmental Quality Standard at all locations.
Draws the Environment Agency's attention to the location of the proposed site in a 'natural amphitheatre' and points out that the area close to the Hamoaze is subject to its own micro-climate and temperature inversions. The City Council asks that these matters are considered in assessing the emissions modelling predictions.	The Environment Agency has considered both the questions of terrain and local weather conditions in its assessment of the Applicant's air dispersion modelling. This is reported in more detail in the main body of this document.
Asks the following specific questions concerning the modelling: - Is 5 years weather data sufficient, would 10 be better? - Does the baseline data adequately consider all other sources of pollution?	The Environment Agency has considered both these questions in its assessment of the Applicant's air dispersion modelling. This is reported in more detail in the main body of this document.
Asks whether the stack is sufficiently high at 95m to adequately disperse pollutants.	The Environment Agency has assessed the model and is satisfied that the stack is of sufficient height to ensure adequate dispersion of pollutants.
Asks whether ambient air quality monitoring will need to be carried out	Ambient air quality monitoring is not included in the permit.

Response Received from Plymouth City Council	
as a condition of granting any permit.	The Environment Agency has sufficient confidence in the precautionary nature of air dispersion modelling and the rigour and accuracy of emissions monitoring not to require ambient monitoring.
Draws attention to the natural amphitheatre in respect of noise emissions from the proposed site, and asks that suitable levels of noise are set within the permit. Also asks whether the noise modelling includes communities the other side of the Tamar.	The Environment Agency's preferred approach to the control of noise is through appropriate equipment and building specifications and if necessary through the imposition of a noise management plan. This is controlled through permit conditions 3.5.1, 3.5.2, PO7 and IC8. Our detailed consideration of the Applicant's noise proposals is set out in Appendix 2 of the AQMAU Audit Report. The applicant's assessment has considered a number of locations the other side of the Tamar.
Asks the following specific questions concerning potential noise impacts: • Impact of queuing traffic on site from both a noise and odour perspective. • Noise from the stack. • Noise from the emergency exhaust stack. • Assurance that the locations chosen for noise monitoring are not subject to noise shadowing.	The Applicant's Odour Management Plan has been incorporated into the permit. Waste will be delivered to site in enclosed or covered vehicles, and that unloading will always take place indoors. The Odour Management indicates that odour from the vehicles will only be detectable in close proximity to the vehicle (i.e. <1m). The odour risk outside the site boundary from vehicles accessing the site is considered very low. The Applicant's noise assessment has been extended to include the impact of queuing traffic and the operation of the odour abatement plant during plant shut down. This is reported in the main body of this document. We are satisfied that noise monitoring has been appropriately carried out.
Asks whether the applicant will be required to confirm noise predictions once the plant has been in operation for 6 / 12 months if a permit were granted and asks whether such an assessment would be required to	This has been included in the permit as an improvement condition.

Response Received from Plymouth City Council	
consider tonal aspects of the noise.	
Asks whether there are back up CEMs and whether the plant would be required to shut down in the event of CEMs failure.	The Applicant has included back up CEMS, the Applicant makes no proposals for other methods in the event that both the operational and the back up CEMS fail. This means that should both sets of CEMS fail such that the Applicant is unable to monitor CO, TOC or particulate matter, then the plant would be required to shut down. If the failure was confined to NO_2, SO_2 or HCl, then operation could continue for a maximum of 4 hours.
Asks whether the Environment Agency will require CEMs to be installed for dioxins and heavy metals should suitable monitoring equipment become available.	Article 11(13) of WID empowers the European Commission to make provision for the introduction of continuous monitoring of these parameters as soon as appropriate techniques are available. The Environment Agency would ensure that any such decision was carried out within the timeframe that the Commission would set.
Asks why low sulphur fuel oil is being used as the back up fuel when natural gas is available. Asks for further details on oil storage and enquires about how much oil will be burnt during commissioning and whether this will necessitate additional storage. Asks whether the Environment Agency consider risk assessment and containment measures for fuel oil spillages.	Natural gas is only available on an interruptible supply basis. The Applicant needs to have certainty that auxiliary fuel is available in the event it is needed to maintain the combustion temperature above 850 ºC, and to safely shut down the plant. There will be 30,000 litres of fuel oil storage capacity. We are satisfied that the proposed storage arrangements are BAT and provide appropriate secondary containment. The amount of oil that will be burnt during commissioning is not specified, but is unlikely to require additional storage.
Notes the Applicant intends to seek accreditation to ISO14001, but that this is anticipated to take 18 months to achieve. Asks whether the Environment Agency requires that an EMS be available prior to the commencement of operations.	The Environment Agency requires that an EMS is in place from the commencement of operations. However we recognise that accreditation of the EMS to the ISO14001 standard cannot be in place at this time. 18 months is not

Response Received from Plymouth City Council	
	an unreasonable time to take to gain accreditation.
Asks that no additional burden be put on the Camels Head sewage treatment works that could add to the odour problems which have been reported to the City Council. In the event that the sewage treatment works is unavailable has the additional lorry traffic from taking waste water away from the site by road been included in the applicant's calculations.	A sewer discharge will be required to meet the sanitary requirements of the workforce. Any process effluent discharged to sewer should not add to the biological loading of the Camels Head sewage treatment works. Additional traffic from offsite disposal of waste water will be minimal.
Seeks confirmation that hot water will not be discharged into the river.	This is confirmed. No such discharge will be permitted.
Asks what measures are included in the Application to deter pests and vermin.	All wastes will be contained within the incinerator buildings, within the bunker in the tipping hall. The Applicant has set out good housekeeping practices in the Application to prevent and minimise the risk of pests and vermin.
Notes that permit conditions do not apply during commissioning. Notes that commissioning can take several months to complete and asks how surrounding residents will be protected from emissions and noise during this period.	Permit conditions will apply from the moment waste is first burnt, which is expected to be towards the end of the commissioning programme. The Applicant is required by the permit to produce and comply with a commissioning plan, which will set out how the environment is to be protected during this phase of the project.
Expresses concern that odour emissions from vehicles queuing on the access road has not been included within the odour management plan submitted with the application.	Waste will be delivered to site in enclosed or covered vehicles, and that unloading will always take place indoors. The Odour Management indicates that odour from the vehicles will only be detectable in close proximity to the vehicle (i.e. <1m). The odour risk outside the site boundary from vehicles accessing the site is considered very low.
Asks that the applicant be required to maintain the building in a good state of repair to ensure there is no fugitive release of dust, and that dust control is BAT through the lifetime of the	Maintaining the building in a good state of repair will potentially impact on noise emissions also. Fugitive releases and noise are

Response Received from Plymouth City Council	
permit.	governed by permit conditions. Environment Agency compliance officers are empowered to take enforcement action where appropriate.
Request that baled waste is not permitted to be stored outdoors at any time.	All waste will be stored indoors.
Seeks confirmation that radioactive waste will not be burned.	Radioactive waste is not one of the permitted waste codes in table S2.2 and so is prohibited from being burned.

2) <u>Consultation Responses from Members of the Public and Community Organisations</u>

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 PPS23. 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. The way in which we have done that is set out below.

a) <u>Representations from Local MP, Councillors and Parish / Town / Councils</u>

Representations were received from Saltash Town Council, who raised the following issues.

Response Received from Saltash Town Council	
Brief summary of issues raised:	Summary of action taken / how this has been covered
The number, types and size of vehicles accessing the site will create additional noise, smell and exhaust emissions. Increased levels of pollution from traffic will adversely affect the health of local residents.	The off-site effects of vehicles are a matter for the local planning authority in their determination of the application for planning permission. Noise, odour and emissions from on site vehicle movements will be highly localised within the installation and are not expected to have any significant effect beyond the site boundary.

Response Received from Saltash Town Council	
The Tamar valley acts as a holding bowl for fog and there is a concern that pollutants will linger in the valley for long periods.	The Environment Agency has considered both the questions of terrain and local weather conditions in its assessment of the Applicant's air dispersion modelling. This is reported in more detail in the main body of this document and in the AQMAU audit report.
Emissions from the incinerator will fall onto the surrounding areas which are largely residential.	The impact of emissions on the neighbouring areas has been considered through a detailed air dispersion model, the outcome of which is reported in section 5.2 of this document. The model predicts that no environmental quality standards, targets or objectives will be exceeded.
Some residential areas are at a similar elevation to the top of the chimney stack.	The Applicant's model takes into account the terrain / topography of the site. The Environment Agency has assessed the model and is satisfied that the stack is of sufficient height to ensure adequate dispersion of pollutants.
Pollution risk to the River Tamar from spillages / leakages from the site including during a flooding event.	All waste materials will be stored indoors and adequately protected from a flooding event. All raw materials have secondary containment to contain leaks and spillages.
The large stack will detract from an area of outstanding natural beauty.	The visual impact of the stack is a matter for the local planning authority to consider as part of their determination of the application for planning permission.
Noise will carry over the open water and will adversely affect residents over a much wider area than at a land locked site.	The Applicant has modelled the noise impact of the proposed installation. The predicted impact is at a level that should not give rise to nuisance or complaint. Conditions have been included in the permit to ensure that the plant is built to the noise standards set out in the model.

b) Representations from Individual Members of the Public

A total of 122 responses were received from individual members of the public directly in response to the consultation. An additional 87 representations were received at the local office, a number of these letters having been written directly to the Environment Agency's Chief Executive or Regional Director. 81 of these 87 representation pre-date the receipt of the permit application. They were not therefore responses to the Environment Agency's consultation process, however they raise essentially the same issues as those raised in the other letters of representation, so effectively have been considered. The 6 letters received after the application was received have been included as consultation responses making a total of 128 responses overall.

The drop-in event was attended by about 150 persons, who were mainly local residents potentially impacted by the proposed facility. Where written comments were made by those attending, these are included in the total number of responses. A total of 56 written representations over and above those described above were collected at the event.

The issues raised by the public were as follows:

Response Received from individual members of the public	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Additional Traffic: Concern was expressed that the lorries bringing waste to the incinerator and taking ash away from the incinerator would add to the level of congestion in local roads adjacent to the site, in particular at Camel's Head. Concern was expressed that the increased traffic and the resultant congestion would result in an increase in pollution from traffic emissions.	Vehicle access to the installation and traffic movements are relevant considerations for the grant of planning permission, but do not normally form part of the Environmental Permit decision making process. If background concentrations are high and contributing to poor air quality, we would in these limited circumstances, consider whether the elevated background from the traffic would result in the incinerator emissions contributing to a breach of an air quality standard. However this is not the case in this application.
Blackies Wood: Concern was expressed that the incinerator would mean the loss of trees and have an adverse impact on local wildlife at Blackies Wood. It was stated that Bats and Owls were present in the wood. The view was expressed that Blackies Wood was public land and	Blackies Wood is located outside the installation boundary. Issues of public amenity linked to Blackies Wood are matters for the local planning authority to consider when deciding whether or not to grant planning permission. The environmental impact of

Response Received from individual members of the public	
that its loss to the public was unacceptable. Some people alleged that newts and slow worms had been relocated in anticipation of the grant of planning permission.	emissions from the installation on Blackies Wood is a relevant matter for permitting. The Applicant's environmental impact assessment shows that the impact is considered acceptable for conservation sites such as Blackies Wood that are not designated as Habitats sites or SSSIs.
Construction: Concern was raised that the land on which the incinerator was proposed to be built was significantly contaminated and that this would be disturbed during construction. Concerns were raised about pollution risks during the construction phase of the project.	Construction is not controlled through an environmental permit. Construction would be controlled through planning conditions including site contamination issues if appropriate.
De-Commissioning: One person enquired about the fate of the plant and the site at the end of its operating life.	At the end of its operating life, the Operator of the plant would need to apply to Surrender the permit. The Surrender Application would need to show that the state of the land had not deteriorated during the lifetime of the permit, otherwise remediation of the site would be required.
Disposal of Incinerator Residues: A number of people raised questions concerning the disposal of incinerator bottom ash, fly ash and pollution control residues. Concern was expressed that the quantity of such wastes was high and that the wastes were hazardous. There were risks from a loss of containment during the transport and disposal of these wastes.	Incinerator residues comprise both incinerator bottom ash (IBA) and air pollution control (APC) residues. The Applicant intends that IBA is further treated for recovery as construction aggregate, and proposed that this is done at a separate facility. APC residues will be consigned for disposal. Transport and the subsequent treatment or disposal of both waste streams is subject to other regulatory controls to protect the environment, which will be also be regulated by the Environment Agency.
Compliance with permit conditions: Some residents expressed concerns that if a permit was granted, conditions would not be rigorously enforced and that any failure to meet permit conditions would not be communicated to the	The Environment Agency is the regulatory body charged with ensuring compliance with permit conditions and will carry out its responsibilities professionally. Information and reports arising from compliance with permit conditions is

Response Received from individual members of the public	
local community.	routinely made publicly available through the public register.
Cumulative Impacts: Some residents wrote concerned that the incinerator would add to existing environmental impacts from the naval dockyard, the sewage works, the Weston Mill Crematoria and the Derriford hospital incinerator.	The Applicant has used data from local ambient air quality monitoring to establish existing background levels of air pollution, which will include the effects of the naval dockyard, sewage works and other local activities. The Derriford hospital incinerator is approximately 6 Km north east of the proposed installation and its impact can be considered to be adequately considered through the measurement of background.
Dioxins: It was stated that any emissions of dioxins were unacceptable as they are carcinogenic. Dioxins will be deposited on agricultural land enter the food chain, ultimately accumulating in the body. One local beekeeper and organic gardener was particularly concerned. Similar concerns about the deposition of mercury were also raised.	The potential impact of dioxins is considered in detail in section 5.3 of this document. This includes an assessment of the impact from deposition on land and food chain. The results showed that the predicted daily intake of dioxins at all receptors, resulting from emissions from the proposed facility are significantly below the COT TDI levels. Mercury emissions are calculated to have a process contribution of 0.25% of the relevant air quality standard.
Energy Efficiency: One person expressed concern that there was no community benefit from the energy produced at the installation and doubted whether hot water would ever be used for heating local homes. Another person commented that in their view construction alongside an existing power station would result in a better overall energy efficiency. Some people doubted the long term viability of steam supply to the operations in the dock yard given recent cut backs at the dock yard.	The incinerator does have a high level of energy recovery in comparison with other plants of this type. It does not however include a district heating scheme. There is also scope for further expansion of steam supply to other parts of the dockyard. The first of the 4 year reviews of energy efficiency has been brought forward by two years to see if progress can be made on these matters more quickly. The key to raising energy efficiency is further use of steam. Co-location alongside a power station would not in itself increase energy efficiency.
Flooding: Concern was raised about the potential impact of flooding at the site.	The Environment Agency provides advice and guidance to the local planning authority on flood risk in our

Response Received from individual members of the public	
	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 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 – which is the case here.
Global Warming: The Application does not contain a proper assessment of the impact on global warming in comparison with alternative methods of disposal.	GWP is one element in the overall BAT assessment and is not by itself a single criteria to determine the suitability of otherwise of a specific waste disposal technique. The Global Warming Potential of the incinerator has been calculated at 0.44 tonnes of CO_2 per tonne of waste incinerated. This is superior to the GWP performance set out in the Incineration BREF of 0.7 to 1.7 tonnes of CO_2 per tonne of waste.
Ham Woods: The application did not contain an assessment of the impact of the incinerator on the Ham Woods local nature reserve.	The Applicant has provided an assessment in response to a Schedule 5 Notice and this has been assessed and found to be acceptable.
Health: The potential for the incinerator to impact adversely on the health of local people was the major concern of most people making representations. Concern was expressed that there was insufficient research on the health impacts of incinerators, some people said that child mortality was higher in areas with incinerator plants. Others stated that incinerators were linked to a range of diseases and affected the foetus. One representation claimed that incinerators shorten life expectancy by about 11 years. A number of people cited that life	Data provided by Plymouth NHS confirms that the general health of the local population in the neighbouring communities is significantly worse than the city average for Plymouth; including mortality and hospital admissions from circulatory and respiratory illnesses. There will be many reasons for poor health (e.g. smoking, alcohol, obesity and exercise); significant disparities in mortality between different parts of the same city is not uncommon in many parts of the UK. The health impacts of incinerators are discussed in detail in section 5.3 of this document.

Response Received from individual members of the public	
expectancy in the local area was already significantly below the UK average with a 14 year difference between the east and west of the city. Residents said there was insufficient data on pre-existing ill health in the neighbouring community. Others pointed out the division of opinion between scientific and some of the medical community on the safety of incinerators. A number of residents suffering from respiratory illnesses wrote in concerned about the impact the incinerator could have on their own health. Similar letters were also written by and the relatives and carers of local people suffering poor health. Specific reference was made to the 2010 COMEAP report on the mortality effects of long term exposure to particulate air pollution. The proposed HPA research project with Kings College to review the evidence of health around incinerators was cited as evidence that incinerators were unsafe. "If incineration was safe, the study would be unnecessary."	The HPA concludes 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." The assessment of environmental and health impacts shows that there will be no exceedence of an air quality standard, target or objective for any pollutant from the incinerator. It should be noted that these standards, targets and objectives are for the most part set for the protection of public health and are set on a precautionary basis. In their 2010 report on "The Mortality Effects of Long Term Exposure to Particulate Air Pollution in the United Kingdom" COMEAP estimate that the removal of all human made particulate matter air pollution (measured as $PM_{2.5}$) from the environment would increase life expectancy by 6 months; and that a reducing the annual average concentration of $PM_{2.5}$ by 1µg/m^3 would increase life expectancy by 20 days. The report stresses that these measures are averages or aggregates across the whole population and it is not known how the effects are distributed among individuals. The maximum process contribution of $PM_{2.5}$ from the incinerator is calculated at 0.1 µg/m^3. It is important to note this is the peak PC and not the average, and that it assumes that the incinerator emits continuously at the particulate emission limit and that all particulate emissions are $PM_{2.5}$. A reduction in life expectancy therefore cannot be inferred from the process contribution calculation. Instead the 2010 report

Response Received from individual members of the public	
	supports the earlier statement 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". The scope of the proposed study with Kings College, commissioned by the HPA, is still under review.
Health Fear and Anxiety: As well as concern about ill health, a number of people expressed the concern that the anxiety and fear of the potential health effects would itself contribute to adverse mental health and wellbeing in the local community.	In the context of Environmental Law, pollution is defined as any emission as a result of human activity which may be harmful to human health or the quality of the environment, cause offence to a human sense, result in damage to material property, or impair or interfere with amenities or other legitimate uses of the environment. This definition does not extend to fear and anxiety. In so far as emissions from the incinerator are concerned, the Environment Agency is satisfied that human health and the environment is protected.
Human Rights: One person wrote to say that if he had to move because of the health effects of the incinerator, this would be an infringement of his human rights, specifically Article 8, the right to a family life.	The Environment Agency is of the view that Article 8 of the European Charter of Human Rights is not engaged.
Impact of Emissions to Air: Numerous concerns were raised about the potential impact of air emissions. These included the impact on: • Air quality in the Camel's Head area where background NO_x of 34 µg/m^3 were reported. • The flora and fauna on Dartmoor • Other SACs and SPAs, where it is stated that the risk of contamination is too high	The impact of emissions to air is considered in detail in sections 5.2 to 5.5 of the decision document. Specifically at Camels Head – the modelled impact of NO_2 emissions at this location is projected to be less than 1% of the EUEQS, and so is considered to be insignificant. The impact on flora and fauna and other SACs and SPAs is summarised in Section 5.4, and it is concluded that there would be no likely significant

Response Received from individual members of the public	
• Deposition of pollutants onto water • Deposition onto land used for growing organic produce • Deposition onto land used for growing food • Deposition onto land leading to a significant level of contamination	effect on the interest features of the protected sites. The impact through deposition is summarised in Section 5.3, and it is concluded that the impact will be substantially below the COT TDI for dioxins.
Impact of Emissions to Water: Concerns were raised about the potential impact of water emissions. The fate of the water used for ash quenching was questioned. Also of concern was spillages from the lorries bringing waste to the site, e.g. on the access road. Concern was expressed over the impact of any emissions to water on the local fishing industry.	There will be no emissions to water from the site other than clean uncontaminated rain water. The Environment Agency is satisfied that the installation will be built with appropriate measures to prevent spillages and other fugitive releases to controlled waters.
Incinerator Ash: Concern was expressed over the applicant's proposals for disposal of some ash to landfill. In particular, loss of containment during transport including water leaking out onto the roadway and wind blown material. Other residents enquired about the treatment that would be carried out offsite, specifically the proposals for an ash treatment plant at Buckfastleigh.	The Applicant proposes only to dispose of APC residues to landfill, although it is likely that some portion of the IBA unsuitable for recovery as construction aggregate may also need to be landfilled. IBA will be transported in covered lorries. APC residues are considered hazardous, and processes for their recovery are not well developed. The Applicant is however required through permit conditions to seek alternatives. IBA treatment at Buckfastleigh will require a separate permit, which will be considered on its own merits.
Light pollution: Concern was expressed that lighting at the installation would be at a level likely to cause nuisance and disturbance to local people. This would increase the stress levels of people living nearby.	Controls over lighting will form part of the local planning authority's consideration of the Applicant's application for planning permission.
Location: Concern was expressed that the proposed incinerator would be located adjacent to a number of residential areas with 14 schools within a one mile radius of the	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

Response Received from individual members of the public	
proposed site. Residents of Talbot Gardens were particularly concerned that the building would be only 62m from their homes. Of specific concern to these residents were the questions of overshadowing, and that the building and chimney would have a dominating dominant impact on their property.	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. In assessing impact at the point of highest concentration this will ensure impacts at the locations identified are also acceptable. The location of the installation can also 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. Questions of overshadowing and dominance of the incinerator buildings on neighbouring residential property are relevant matters that will need to be taken into account by the local planning authority, but are not relevant for permit determination.
Local Topography: Although the stack is 95m high, concern was expressed that the surrounding land is also of a similar height and contains residential development; and that this would adversely impact on the dispersion of pollutants from the chimney stack. The combination effect of local weather conditions and local topography was raised in a number of consultation responses.	The Applicant's model does take into account the terrain / topography of the site. The Environment Agency has assessed the model and is satisfied that the stack is of sufficient height to ensure adequate dispersion of pollutants.
Local Weather Conditions: After health, this was the issue raised by most people in the consultation. Concern was expressed that a combination of low cloud and light winds would adversely impact on the dispersion of pollutants from the chimney stack. Some people also pointed out that the Tamar Valley and Hamoaze Estuary frequently have low	The Environment Agency has considered both the questions of terrain and local weather conditions in its assessment of the Applicant's air dispersion modelling. This is reported in more detail in the main body of this document and in the AQMAU audit report. To investigate the impact of local factors on the meteorological

Response Received from individual members of the public	
hanging mists and temperature inversions, particularly in autumn and winter. At other times, the prevailing wind is from the Southwest and this will blow pollutants inland over residential areas. High levels of rainfall also mean that consideration must be given to pollutants being washed out of the sky and deposited on the surrounding land. Two residents made specific reference to a public inquiry in 1971 into the Millbrook Power Station and stated that the evidence over weather conditions is still relevant today. Research into local weather conditions was reported to be available from Plymouth University from studies carried out in the late 1980s / early 90s. One person provided references of MSc and PhD student theses into this question. Finally one local resident queried what impact the release of heat into the environment from the air cooled condensers would have on the local weather.	conditions, the Environment Agency has used Met Office Numerical Weather Prediction (NWP) data centred at the location of the proposed facility and compared this with the Applicant's model. We are satisfied from this work that the Applicant's model predictions can be used to adequately assess the environmental impact from emissions to air. Heat from the air cooled condensers is not expected to impact on local weather conditions.
Mercury Emissions: Some letters referred to incidents where there had been mercury releases to air from MVV plants operating in Germany.	This is assumed to refer to alleged exceedences of the WID emission limit value at MVV plants operating in Germany. The Environment Agency is satisfied that MVV's proposals for preventing and minimising mercury emissions in Devonport are BAT. Any exceedance of the mercury emissions limit would be investigated and the Environment Agency would take appropriate enforcement action.
Monitoring of emissions: Concern was expressed that dioxin monitoring was not sufficiently frequent. Whilst it was recognised that continuous monitoring was not technically feasible, a monitoring frequency of 6 months was inadequate.	Dioxin monitoring is required quarterly in the first year of operation. Thereafter it will be every 6 months. This is in accordance with the requirements of WID. There is no continuous method

Response Received from individual members of the public	
Concern was also expressed that monitoring of fine particles and nano-particles was not being carried out. Questions were asked as to whose responsibility it would be to monitor emissions.	available for monitoring particulate emissions within specific size ranges. The Environment Agency's experience of seeking particle size information from periodic monitoring of particulate emissions is that there is technical difficulty in collecting sufficient sample to carry out meaningful analysis because of the low rate of stack emissions. Emissions are monitored by the Operator to the standards set out in the permit. All equipment, staff and laboratories carrying out monitoring work will require appropriate MCERTS accreditation.
Natural Habitat: A number of residents reference wildlife which is flourishing in the local area, protected birds and otters in the river; and swans in Kinterbury Creek. Some residents report that Bat, Owls, Foxes, Deer, Badgers and Slow Worms are present in Blackies Wood.	The impact of the installation on local nature reserves and wild life sites as well as sites of special scientific interest and Habitat sites in summarised in section 5.4 of this document. This concludes that there is unlikely to be harm to these sites. Blackies Wood sits on the boundary of the installation and is too close for there to be any significant impact from emissions. The Applicant has also indicated that it will implement a local management plant for Blackies Wood, which forms part of the development site (for the purposes of planning approval) but is outside the installation boundary (for the purposes of environmental permitting). The proposed management plan is a matter for the local planning authority to consider in determination of the application for planning permission.
Need for Incineration: The need to build an incineration plant was questioned on the basis that over the lifetime of the project, increasing recycling rates would reduce the amount of waste available, resulting in waste having to be transported to the site from ever increasing	The capacity of the incinerator is primarily a matter for the Applicant designed to meet the waste disposal needs of the local authority or authorities. The proposed facility forms part of an integrated waste management strategy; any material arriving at the

Response Received from individual members of the public	
distances. The location of the site near a former railway spur and in a dock area gives rise to concern that waste will be imported by rail or by sea.	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. It is sometimes argued that diminishing supplies of residual waste from the surrounding area over the lifetime of the installation will result in the importation of waste from outside the area or sub-region. This is similar to the point above on the potential impact on local recycling and is a matter for the local waste strategy.
Nitrogen Dioxide: Attention was drawn to ambient air monitoring data at the Camel Head junction showing a background level of 33.9 µg/m^3 at this particular location.	From the air modelling data, the process contribution of NO_2 at the Camel Head junction is predicted to be less than 1% of the EUEQS (i.e. <0.4 µg/m^3). Emissions from the incinerator will therefore not significantly contribute to NO_2 levels at this location and there will be no predicted breach.
Noise pollution: Concern was expressed that noise levels would be at a level likely to cause nuisance and disturbance to local people. These concerns arise from both the operation of the incineration plant and from the vehicle noise of lorries transporting materials to and from the site. It is claimed that the increased noise levels would increase stress levels of local people living nearby. Specifically there is concern about vehicle noise during the daytime and a low drone from machinery during the night time. It was stated that guidance by the World Bank recommends that incinerators should not be built closer than 300m from residential areas to protect against noise and odours.	The Applicant has submitted a detailed noise impact assessment, which predicts that noise will be controlled such that it is unlikely to give rise to complaints. The Environment Agency has included conditions in the permit to ensure noise is controlled in line with the prediction in the Application. The World Bank document provides general high level advice to decision makers. The report's authors state that the report should be used with caution since "both technical and financial feasibility are very site-specific". Site specific assessment which has been scrutinised by the Environment Agency indicates that noise and odour effects can be properly mitigated.
Odour: Concerns were expressed over odour arising from the transport	Materials will be stored indoors. When the incinerator is operational,

Response Received from individual members of the public	
and storage of waste materials at the site. Some residents also mentioned that there is already an odour nuisance from the nearby sewage works, and that this has not been addressed.	odour control will be through extracted air being used for combustion. When the plant is shut down, a carbon filter will be used. Complaints about odour from the sewage works is a separate matter.
Particulate Emissions: One person referred to what they said was an EA claim that UK bag filters allowed 90% of PM_1 and 35% of $PM_{2.5}$ to pass through them. Reference was also made to the formation of secondary particles from incinerator emissions. Finally it was alleged that the UK used equipment for $PM_{2.5}$ monitoring in ambient air which was capable of being adjusted to give fraudulent readings.	This is a reference to manufacturer's data contained in an Application for an incineration plant at Newhaven made in 2006, which was reported in the decision document for that permit. The Incineration BREF states that fabric filters generally provide effective abatement down to below 5 mg/m^3 of particulate material. Secondary particles are formed through reactions taking place in ambient air. Stack gases from all combustion processes can contribute to this, however there is currently no reliable method available to determine the scale of this effect. Controls on emissions from incinerators are through setting emission limit values, i.e. control at source; and not through ambient air monitoring. Ambient air quality monitoring measures the aggregate level of particulates from all sources, (natural and manmade) and given the low level of emissions from the incinerator could not be used to accurately measure the incinerator's impact. Allegations that ambient air quality monitoring is not properly carried out in the UK is therefore not relevant to this issue.
Precautionary Principle: It was stated that a precautionary approach should be adopted on emissions of nano-particles, given the amount of data on the adverse health effects of these very small particles. Concern was expressed that ultra fine particles emitted from the incinerator would not	The United Kingdom Interdepartmental Liaison Group on Risk Assessment (UK-ILGRA) state in their paper "The Precautionary Principle: Policy and Application" that the precautionary principle should be invoked when there is good reason to believe that harmful effects may occur

Response Received from individual members of the public	
be filtered out and would be present in the ambient air and that a film of dust will be deposited on the surrounding area.	and the level of scientific uncertainty about the consequences or likelihood of the risk is such that the best available scientific advice cannot assess the risk with sufficient confidence to inform decision making. The Health Protection Agency, (Response to British Society for Ecological Medicine Report, "The Health Effects of Waste Incinerators) say that "as there is a body of scientific evidence strongly indicating that contemporary waste management practices, including incineration, have at most a minor effect on human health and the environment, there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new incinerators". Particulate emissions from the incinerator are at such a low level and would add so little to the background that a film of incinerator dust being deposited on the surrounding area is not credible.
Public Inquiry: A number of residents asked that the matter be dealt with through a public inquiry.	It is unclear whether this request relates to the planning decision, the permitting decision or both. We have sought in our engagement to deal fully and fairly with all concerns raised and this is reflected in the explanations given in this document.
Public Safety: Concerns were made that the introduction of an incineration plant increased the risk to the community from an accident to an unacceptable level. Specific concerns were around the likely impact of a safety incident at the dockyard on the incinerator and vice versa, in particular that the dockyard is a nuclear site, has explosive ordnances within it, and has helicopters flying into and out of it. That there were plans to introduce a	The MoD has carried out numerous risk assessments to its own operations arising from the presence of the incinerator. Some adjustments to their risk assessments have been made, but the MoD have made the site available for development as an incinerator and have no objection to its use as such. The fatality in Rotherham referred to, actually occurred at an Autoclave Plant treating waste not as incorrectly reported in the media at an incineration plant.

Response Received from individual members of the public	
facility to decommission nuclear submarines and provide a new base for the Marines. A number of representations stated that there had been explosions at other incinerator plants, including a fatality in Rotherham. Concern was also expressed that additional activity close to the dockyard could compromise security at the naval base, residents raising these concerns reference the decommissioning of nuclear submarines which will be undertaken at the dockyard. One resident asked why the principles set out in COMAH were not being applied at the site. In short, there is a view amongst a significant number of local people that there is an over accumulation of hazardous activities in the one locality. A different type of concern was more hazardous road conditions for children travelling to school from the increased levels of lorry traffic.	The COMAH regulations are largely triggered by the storage of hazardous materials above certain thresholds. The Incinerator is not subject to the COMAH regulations. The impact of the installation on road traffic and road safety will be something the planning authority takes into account in deciding whether or not to grant planning permission.
Regulation: It was stated that Permitting and Planning Authorities should work together on projects of this type rather than work in isolation.	Environmental permitting and planning are separate processes, but complementary in that whereas the planning system looks primarily at land use, the permitting system looks at controlling the environmental impact. The Applicant has in this case sought to submit both planning and permitting applications together. We have sought in our engagement with the public to make people aware of the respective roles of each authority. As discussed above we have in this case been able to produce this draft decision to help inform the planning authority's consideration of the planning application.
Terrorism Target: Some people expressed concern that the incineration plant would be a target	The MoD has carried out numerous risk assessments to its own operations arising from the presence

Response Received from individual members of the public	
for terrorism, either directly through the deposit of radioactive waste in residual waste for collection. Or indirectly as a means to create an incident that would impact on the naval base.	of the incinerator. Some adjustments to their risk assessments have been made, but the MoD have made the site available for development as an incinerator and have no objection to its use as such. The risk of terrorism from persons illegally depositing radioactive material in domestic residual waste bins is considered remote.
The Chimney: In addition to concerns over the visual impact; concern was raised that the height of the chimney (95m) was indicative that emissions must be significant, otherwise the chimney would not need to be that high. The applicant has increased the proposed height of the chimney from 85m to 95m and this undermined public confidence in the applicant's reassurances over the impact of emissions. Some people thought the chimney should be higher still. One person was concerned over the risk to public safety should the chimney collapse.	The Applicant is required to design the chimney in accordance with the principles of BAT, and to ensure there is no significant pollution. The effect of a 95m stack on the environmental impact of emissions has been considered in detail in section 5 of this document. The impact of the stack at 85m has not been considered. Although not a matter controlled through this permit, the likelihood of the chimney collapsing is considered remote. Building construction standards are a matter for control through building regulations.
Unlawful: One correspondent alleged that incineration was contrary to requirements of the Waste Framework Directive in that it puts public health at risk.	This comment is to taken to be a reference to articles 1 and 13 of the 2008 EU Waste Framework Directive. The Environment Agency believes that incineration as a waste treatment and disposal technique can be designed, built and operated in a manner that is compliant with the requirements of the Waste Framework Directive. Indeed the Directive recognises incineration as a technique for waste treatment. The potential impact on public health has been a key issue considered as part of this determination and this is described in the main body of this document.
Visual Impact: Concern was expressed that the visual impact of	Visual impact and he impact on local amenity is a matter for the local

Response Received from individual members of the public	
the building and the chimney would blight the neighbouring residential areas and result in reduced property values. The view was expressed that the incinerator was an imposition on a poor working class neighbourhood. It was also stated that the Tamar Valley was an Area of Outstanding Natural Beauty and that the incinerator would detract from this. Finally that the building would cast a shadow on adjacent residential property.	planning authority to consider when deciding whether or not to grant planning permission. Likewise consideration of the impact of the installation on the appearance of an Area of Outstanding Natural Beauty is also a matter for the local planning authority. Except that the Environment Agency should consider whether the environmental impact of emissions from the incinerator are likely to harm the features that result in its designation as an AONB. This has been considered in section 7.2.3 of this document.
Vermin: That the waste would attract vermin in the form of birds (seagulls), mice and rats and that this would impact adversely on the surrounding community.	All wastes will be contained within the incinerator building, within the bunker in the tipping hall. The Applicant has set out good housekeeping practices in the Application to prevent and minimise the risk of pests and vermin.
Waste Types: Concern was expressed about the uncertainty over the waste types that would be burnt. Specifically that the applicant could not control what may or may not be present in residual household waste. One person referred to this as 'uncontrolled waste'. Other concerns were that the plant could be used to burn sewage sludge from the nearby sewage works. Some people were concerned that the incinerator would be used for the disposal of nuclear waste originating from the naval base.	The wastes which can be burnt are listed in table S2.2 of the permit. The Operator is not authorised to burn any waste not listed in table S2.2. All the wastes in table S2.2 are considered suitable for incineration as described in section 4.3.6 of this document. The burning of sewage sludge is not authorised by the permit. The burning of screenings from the primary (pre-)treatment stage of waste water treatments plant is authorised by the permit. The burning of nuclear waste is not authorised by the permit.
Wrong Technology: It was claimed that there were better environmental solutions than incineration, specifically plasma arc gasification was cited as an alternative technique. Also cited were autoclaving and anaerobic digestion.	It is often argued that Incineration is not an environmentally sustainable technology and therefore almost by definition cannot be considered to be the Best Available Technique (BAT). The Environment Agency is aware that a number of proposals are coming forward for other ways of

Response Received from individual members of the public	
It was stated that incineration would discourage recycling and recovery activities higher up the waste hierarchy and that more could be done now to recover more materials from residual municipal waste.	dealing with waste streams such as pyrolysis and mechanical / biological treatment. At this time however, mass burn incineration at this scale can still be considered BAT, subject to the appropriate assessments being made. Anaerobic digestion is most suitable for high moisture content biodegradable wastes such as food and agricultural wastes, and can be applied where there is separate collection of these waste streams. Anaerobic digestion is not however appropriate for mixed municipal waste. Some technologies such as plasma arc gasification are currently considered not to meet the definition of 'availability' due to their very limited application worldwide.

B) Consultation on the Draft Decision

This section reports on the outcome of the public consultation on our draft decision carried out between 19th December 2011 and 3rd February 2012 and the public drop-in event held on 16th January 2012 at the Barne Barton Community Centre.

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

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

Response Received from individual members of the public	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Reference was made to the section in the decision document on **abnormal operations** and claimed this indicated a plant running out of control.	The assessment in the section on abnormal operations considers a worst case scenario of unabated emissions for up to 4 hours continuous operation and up to 60 hours per year. The purpose of this assessment is to consider the environmental impact of emissions under the worst case set of operating conditions and should not be interpreted as indicating a loss of control of the plant, or any acceptance that the plant can be run in this manner.
Further concerns were raised about **air quality at Camels Head**. It was pointed out that an NO_2 annual mean of 33.9 µg/m^3 had been measured at Camels Head Junction. Calculations were presented indicating that the increased traffic due to the incinerator will result in an increased background level, to which emission from incinerator will further add resulting in a risk of an exceedence of the EUEQS of 40 µg/m^3 and possible declaration of an AQMA.	From the air modelling data, the process contribution of NO_2 at the Camel Head junction is predicted to be less than 1% of the EUEQS (i.e. <0.4 µg/m^3). Emissions from the incinerator will therefore not significantly contribute to NO_2 levels at this location. The impact of increased traffic due to the incinerator is one of the matters taken into account by the local planning authority when reaching its decision on the grant or planning permission.
Some people requested that **ambient air quality monitoring** should be done at more representative locations to generate data to monitor the impact of the incinerator on local air quality.	The Environment Agency's approach is to monitor emissions at source and use computer modelling to predict the impact of emissions on the environment. Ambient air quality monitoring is an important tool to provide data on the overall levels of pollutants in the atmosphere. However ambient air quality monitoring measures pollution from all sources. The impact of the incinerator should be so low relative to background levels for ambient air quality monitoring to be an in appropriate technique to monitor its impact. This is particularly the case given the variable impact of other

Response Received from individual members of the public	
	sources of pollution, primarily road traffic.
A number of residents challenged our view that SNCR with urea was **BAT**, when SCR with ammonia was clearly more effective at reducing NOx.	The BAT assessment is summarised in section 6.2.3 of this document. This shows that SCR with ammonia will reduce the predicted environmental concentration of NO_2 at the peak location by 0.9% of the air quality standards at an additional cost of £1.4m per annum. The definition of BAT includes within it consideration of economic viability. The BAT assessment considers that the additional cost when set against the relatively small improvement in atmospheric NO_2 is not justified. We believe this is a correct interpretation of BAT and agree that in this case the additional costs of SCR are not justified.
Some correspondents referred to the **carbon footprint** of the plant, citing the distance of incoming waste transport and the transport of IBA and APC residues.	The Environmental Permitting Regulations regulate activities on the site of the installation. These broader questions of environmental sustainability are addressed through the planning system.
Consideration of **chimney height** – a local councillor asks that the stack height be increased to 100m as this would further reduce NO_x emissions by 30%.	The BAT assessment in summarised in section 6.1.2 of this document. Figure 5.1 of Section 13 of the Application contains a graph showing the impact of chimney height on the peak predicted level of ground level NO_x. The graph shows that further increases in chimney height will reduce the predicted peak ground level concentration. There is a diminishing benefit as the stack height increases and it is always a matter of judgement when the point is reached where the additional cost and other impacts outweigh the environmental benefit. The Applicant's view that 95m is that point is backed up with a detailed analysis of the environmental impact of emissions from the chimney which we have considered in detail in section 5 of this document. Taking all these

Response Received from individual members of the public	
	matters into account we are satisfied that a 95m chimney stack is BAT for this installation.
A number of people asked what sanctions the Environment Agency had at their disposal to ensure **compliance with permit conditions** including emission limit values. Concern was expressed that some plants in UK had previously exceeded emission limits, e.g. Isle of Wight and Crymlyn Burrows.	Depending on the severity of the breach, we can prosecute, give a formal caution, issue a formal warning letter or give advice. In addition to the above we can also serve an enforcement notice specifying steps the operator must take and by when they should be taken. We also have a number of civil sanctions at our disposal. Failure to comply with an enforcement notice usually results in prosecution. In very serious cases, we can stop operations altogether by either suspending or revoking the permit. A copy of the our Enforcement and Sanctions Statement can be viewed at http://www.environment-agency.gov.uk/business/regulation/31851.aspx The Isle of Wight and Crymlyn Burrows incinerators have both had past breaches on the dioxin limit. In both cases, the Environment Agency has applied its enforcement tools to secure improvements in the operation of these facilities to bring them back into compliance. Both plants are currently operating in compliance with the dioxin limit.
One resident asked whether the Operator will be able to claim **Crown Immunity**.	The Operator will not be able to claim Crown immunity.
A number of people raised concerns about the plans for the **decommissioning of nuclear submarines** in the dock yard. Firstly that this raised the overall hazard from the dockyard area to the local community, secondly the potential for radio active waste to be burnt in the incinerator.	Hazards which may be present from other activities are not matters for this determination process. The consequences of accidents occurring in the dockyard on the incinerator have been assessed (see section 4.3.4). The plant will not be authorised to burn radio-active waste. If the

Response Received from individual members of the public	
	Operator wished to do so at a future date, they would need to apply for a variation to their permit. Any such application would be considered on its merits and be subject to appropriate consultation.
One resident raised concerns about the **deposition of pollutants** onto allotments.	The deposition of pollutants is considered in some detail in sections 5.3.3 and 5.3.4 of this document. The exposure to dioxins and furans through ingestion via the food chain is found in all cases to be less than 1% of the tolerable daily intake of these substances.
A number of correspondents pointed out an apparent **error in the quantity of diesel fuel** that will be used at the installation.	The fuel use was reported in error at 365 litres/yr when it should have read 365,000 litres/yr – this has been corrected. The error does not materially impact on the decisions or permit conditions.
One correspondent complained that the incinerator would add to **existing emissions** including those from a training fire station nearby which was burning oil and rubber.	Presumably the fire station is burning oil and rubber for the purposes of training. This matter is outside the remit of this permit, but the matter has been referred to the local Environment Agency office for them to consider. The impact of emissions from the incinerator have been previously documented.
A number of correspondents asked what account had been taken of the **European Nitrogen Assessment**?	The scope of the European Nitrogen Assessment is much broader than the impact of NO_x emissions to air. Where the European Nitrogen Assessment refers to NO_x emissions, it reinforces the importance assigned to this issue through the relevant European Directives. These Directives have been used to assess the impact of NO_x emissions, which is described in detail within the main body of the decision document.
One person wrote to request that emissions should be discharged into a **fast moving body of water** instead of up a stack.	This is not a practical proposition and is not considered to be an available technique. In any event it is unlikely that this would be effective in

Response Received from individual members of the public	
	removing pollutants and would more likely result in their dispersal into the atmosphere at ground level. This would probably give rise to a bigger environmental impact.
One correspondent raised concerns over the surcharging of sewers giving rise to **flooding** i.e. that there was insufficient capacity to carry rainwater during periods of heavy rainfall.	Flood risk in considered in section 4.2.1 of this document. In the unlikely event of a flooding incident occurring, the Environment Agency is satisfied that protective measures at the installation will prevent this leading to a pollution incident.
Misleading presentation of the impact on **global warming** – one correspondent questioned the way in which the Global Warming Potential had been calculated. The calculation is challenged on the basis that it is government policy to decarbonise the electricity supply industry over the proposed lifetime of the project. Therefore CO_2 credits for displacing fossil fuels burnt elsewhere to generate electricity should be substantially reduced.	This is a fair point. The GWP calculated in section 6.3 of this document is the GWP under current conditions. (0.44 tonnes CO_2 per tonne of waste incinerated) The UK government has a target to reduce carbon emissions by 80% from 1990 levels by 2050. This will include significant investment in low carbon energy sources such as wind, solar, biofuels and nuclear. This will have the effect of significantly decarbonising the UK's energy supply industry over time. Given that the operational lifetime of the incinerator is 25 to 40 years. The impact of these policies will be such as to increase the relative or net GWP of the incinerator during its operational lifetime. If the impact of fossil fuel displacement were totally disregarded the GWP would increase to 0.93 tonnes CO_2 per tonne of waste incinerated. However this would also fail to take into account any contribution to reducing GWP from the renewables content of the waste being incinerated, which is currently not included in the GWP calculation. This would act to reduce the net GWP. These are matters that will need to be taken into account in the periodic review of the BAT Reference

Response Received from individual members of the public	
	document for incineration. Taking all these factors into account, it is still considered that the impact of the incinerator is acceptable in GWP terms.
Since the publication of the draft permit and decision document the **HPA** has announced a new study into the impact of incinerators on **public health**. Many correspondents felt that the Environment Agency should call a moratorium on permit applications until this study is completed.	On 24th January 2012, the HPA announced a new study to further extend the evidence base as to whether emissions from modern well run Municipal Waste Incinerators affect human health. The HPA will be funding the Small Area Health Statistics Unit, Imperial College London, and the Environmental Research Group, King's College London, both part of the MRC-HPA Centre for Environment and Health, to carry out the study. In announcing the study the HPA said "The HPA's current position that well run and regulated modern Municipal Waste Incinerators (MWIs) are not a significant risk to public health remains valid, but the study is being carried out to extend the evidence base and to provide further information to the public on this subject." In view of this, the Environment Agency does not consider there is any basis for calling a moratorium on determining permit applications nor does it have the power to do so.
Some residents challenged the Environment Agency that their **'human rights'** would be violated arising from the proximity and noise levels specifically their right to the 'peaceful enjoyment of their possessions'.	The Environment Agency's view is set out in section 7.2.2 of this document. Our consideration of noise impacts is set out in section 5.6. We are satisfied that the permit will control noise such that it does not cause noise nuisance to local people.
Inadequate consultation – over 140 people wrote in to complain that the Environment Agency's public consultation was inadequate. Specifically that the Barne Barton drop in event at Tamar View	The drop in event was well attended with around 80 people attending. The drop in event formed part of the consultation only. Its purpose was to assist people in making their response by giving them the

Response Received from individual members of the public	
Community Centre did not give adequate opportunity for local people to present their views; that the timing of the event was too limiting; and that a larger more central venue in Plymouth should have been used. Two different standard letters / email were received in response to an organised campaign.	opportunity to question Environment Agency staff. People did not need to attend the drop in event in order to participate in the consultation. Excluding the complaint emails around 120 consultation responses were received, a similar number as at the application stage. We are satisfied that our consultation arrangements were appropriate for an application with a high level of public interest.
A number of correspondents claimed that **incineration was banned in the USA** and so questioned why the technology was still being used in the UK.	Currently there are 86 facilities in the United States for combustion of municipal solid waste (MSW), with energy recovery. These facilities are located in 25 states. Incineration is not banned in the USA, but no new plants have been built in the US since 1995. Some plants have however been expanded to handle additional waste and create more energy. The 86 US facilities have the capacity to produce 2,720 megawatts of power per year by processing more than 28 million tons of waste per year.
The Buckfastleigh Community Forum made a detailed submission on the subject of **Incinerator Bottom Ash (IBA)**, which was also referred to by other correspondents. The following points were made: • References in the planning permission to IBA being inert and linkages in the planning permission to the development of am IBAA processing plant at Buckfastleigh. • References in the planning permission to a minimum of 95% landfill diversion amounts to the pre-determination of an acceptable reprocessing of IBA. • Lack of confidence in the sampling protocol for	IBA is a waste material arising from the incineration process. The Applicant in this case proposes to carry out minimal treatment onsite and arrange for the material to be processed and treated offsite. This means that when the IBA leaves the Devonport site, it will still be a waste and subject to all the regulatory controls which apply to waste. It is not the practice, nor would it be lawful, for the Environment Agency to seek to control through this permit the downstream uses or treatment of IBA to specific uses or waste facilities. What we have done is to impose a requirement that the waste hierarchy is applied to the IBA see section 4.3.9 of this document. Planning conditions which link the

Response Received from individual members of the public	
assessing the hazards status of untreated IBA leaving the Devonport site. • H14 eco-toxicity testing and H15 hazardous property testing should form part of the tests carried out on IBA at the Devonport site. • That toxic metals and dioxins are leached from treated IBA used as an aggregate in construction projects causing pollution. • That treated IBA should be registered and regulated as a product under the EU REACH Directive. • Restricting waste inputs by having mechanical pre-sorting would produce more homogeneous and less toxic ash residues. • A minimum storage capacity of 5,000 tonnes of IBA is needed at Devonport based on sampling and testing frequency in the draft permit. This is not clearly set out. • Evidence from Germany is that MVV incineration plants are not well managed. • The business case for incineration is predicated on the reuse of treated IBA as aggregate and its disposal as hazardous waste would have a major negative impact on the economics of waste incineration. The submission from Buckfastleigh Community Forum contains a number of appendices setting out in more detail their supporting arguments, including a submission to a HMRC consultation on the application of landfill tax to IBA residues.	granting of planning permission for the Devonport Incinerator to developments at Buckfastleigh or elsewhere are not relevant matters for our determination of the Environmental Permit Application. Any development at Buckfastleigh would be subject to its own permit application, which would be assessed on its own merits. Our assessment here is not predicated on there being a development there. We have included in the Permit conditions which place an obligation on the Applicant to ensure that the recipient of the IBA must be provided with information on the nature, composition and hazard status of the waste. Questions on eco-toxicity and other potentially hazardous properties of processed and treated IBA may be relevant matters for subsequent downstream uses of these materials. However the point at which these matters should be considered is at the point of use of the treated materials. So far as the permit is concerned, the Operator needs to provide sufficient information to demonstrate the waste hierarchy is being applied and compliance with duty of care requirements. This is achieved through the permit conditions. On restricting waste inputs, the community forum argue two points firstly that pre-sorting will reduce the hazard of the IBA, one of the appendices in the submission however argues for RDF instead of mass burn. Residual municipal waste will contain small amounts of material, which if separately collected would be considered hazardous. Whilst pre-sorting would assist removing some of these materials, waste collection

Response Received from individual members of the public	
	authorities may prefer to make investment in source segregation and ultimately this is a matter for them. In any event, we are satisfied that the incinerator has been designed and will be operated such that it can receive and treat the wastes listed in the permit. On RDF, the community forum appear to be arguing that an RDF combustion process would be preferable to a mass burn incinerator. This is effectively an argument that the wrong technology is being applied and this has been addressed elsewhere. Notwithstanding this, an RDF combustion plant would be subject to the same controls over IBA as for a mass burn incineration plant. The community forum's calculation of IBA storage capacity assumes that the full output of the plant must be retained on site between sampling intervals. This is not the manner in which the IBA monitoring regime is intended to operate. As with all emissions monitoring, the purpose is to make measurements which are representative of the emissions, using appropriate statistically based sampling methods. The IBA will not be quarantined pending the results of analysis. Concerns raised over incidents at an MVV plant in Germany is addressed elsewhere in this section. Finally, the business case for incineration and the landfill tax status of IBA are outside the remit of Environmental Permitting.
Building on the submission of the Buckfastleigh Community Forum, another correspondent has advocated the use of plasma treatment of the **Incinerator Bottom Ash** to render it safe.	The Environment Agency is aware of plasma based processes not just for the treatment of IBA but also as an alternative to waste incineration. However to date, the Environment Agency has received only one application for a plasma-based waste

Response Received from individual members of the public	
	thermal treatment process which is currently being determined. We have had discussions with the applicant to ensure that the legislative requirements can be delivered and we are not imposing any fundamental barrier to the development of this technique. If such plant can be demonstrated at an appropriate scale, it may be that it will become available for other applications in the future.
One resident asked why we had not consulted the proofs of evidence for the 1971 Millbrook Power Station Inquiry concerning the **local micro-climate**. Another resident cited two old studies carried out on the local climate.	We agree that there will be differences between the meteorological data at Mountbatten and at the locations of the proposed facility. We also agree that the facility's location in an estuary could have an affect on localised met conditions such as temperature inversions. The important question is whether these differences are sufficient to affect MVV's conclusions that exceedences are not likely of the Environmental Quality Standards (EQS). This is discussed in Annex 1 of the AQMAU Report and summarised in section 5.2.6 of this document. Our conclusions are that any differences in predicted concentrations are not sufficient enough to alter the conclusions made using Mountbatten. Although the meteorological data used in our checks is considered to represent the local conditions (in general terms), the models do not explicitly predict complex conditions relating to vertical profiling e.g. inversions. However, we have also conducted a number of studies (some of which are local to this area) using the US EPA CALPUFF modelling system. CALPUFF models predictions through a 3-dimensional meteorological wind field.

Response Received from individual members of the public	
	Our studies using CALPUFF do indeed give higher short-term concentrations at sensitive receptors. This is likely to give higher predictions for those pollutants with 1 hour maximum EQS' (e.g. pollutants such as hydrogen chloride and hydrogen fluoride). However, the increase in predicted concentrations is not significant enough to change conclusions.
A number of people referred to exceedences of **Mercury Emissions at the MVV Korbach** plant in Lugwigshaven.	The Korbach Plant is different to the proposed Plymouth Plant in that it burns Refused Derived Fuel (RDF). The high mercury emissions occurred in August 2009. They were investigated and traced to contamination in the RDF fuel supply. Around 1,300 tonnes of contaminated RDF was removed for alternative treatment and disposal elsewhere, before the plant was restarted. There have been no further incidents since the plant was restarted.
Missing waste code 020108 – one resident wrote to say this waste code was missing from the permit.	Waste code 020108 is deliberately excluded from the list of wastes that can be burnt. This waste code describes agro-chemical waste containing dangerous substances and there are no proposals for such wastes to be burnt at this plant.
Concerns were raised about overshadowing of neighbouring housing and a reduction in **natural light** to these properties.	As with visual impact issues generally, these are matters that the local planning authority will have taken into account when deciding to grant planning permission. They are not issues which form part of the permit decision making process.
One resident requested that the incinerator and transport to it should be located underground to prevent **odour impacts**.	Odour impacts have been previously considered. The proposals are considered appropriate to prevent odour nuisance.
Particulate emissions continued to be a cause for concern. A number of correspondents pointed out that this was essentially the same composition as APC residues and that these were	Particulate emissions will contribute less than 1% of the relevant EU air quality standard when compared with both the PM_{10} and $PM_{2.5}$ standards. As such we consider that their impact

Response Received from individual members of the public	
classified as hazardous waste. Specifically one correspondent asked whether particulate emissions could contribute to the breach of an EQ EQS. Further concerns were raised about the emission of nano-particles and their health impact.	will be insignificant and most unlikely to contribute to an exceedence of these standards. Particulate emissions are not necessarily exactly the same composition as the APC residues. Nevertheless as well as the monitoring of particulate emissions, the Operator is required to carry out monitoring for a suite of heavy metals and for dioxins and furans. Dioxins, furans and heavy metals (other than mercury) will be present as part of the emitted particulate material. The health impacts of incinerators are considered in section 5.8 of this document. This includes assessment of particulate, heavy metals and of dioxins and furans.
We received numerous complaints about the **planning process** – both in terms of the process followed, the conduct of the planning committee meeting, and the decision made. Reference was made by some correspondents to high profile refusals of planning permissions by other local planning authorities.	The conduct of the process for determining planning permission is that of the local planning authority, in this case Plymouth City Council. Local Planning Authorities are required to make decisions on the planning merits of each application and these will be different in every case.
Many residents raised the concern about the location of the incineration in an area of **poor health** and deprivation.	The Application has been assessed against air quality and other environmental standards. For many pollutants, these standards are specifically set to be protective of public health. So notwithstanding that the general health of the local population is poor in comparison with other parts of Plymouth, the Environment Agency is satisfied that the incinerator will not result in the exceedence of these environmental standards or give rise to any significant health impacts.
One person asked for clarification on **plume visibility** asking whether it referred to a 24 hour working day?	Given the temperature and water vapour content of the exhaust plume, the local weather conditions are such that the plume may be visible 12 to 16

Response Received from individual members of the public	
	% of the time (this includes hours of darkness).
Some residents challenged the Environment Agency that the decision was lacking in **precaution** and unlawful.	The precautionary principle should be invoked when there is good reason to believe that harmful effects may occur and the level of scientific uncertainty about the consequences or likelihood of the risk is such that the best available scientific advice cannot assess the risk with sufficient confidence to inform decision making. Our assessment of the impact of emissions from the incinerator together with the advice of the Health Protection Agency, that "as there is a body of scientific evidence strongly indicating that contemporary waste management practices, including incineration, have at most a minor effect on human health and the environment"; lead us to conclude that there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new incinerators"
One resident reported that the Council had delayed plans to build a new **recycling centre** at Chelson Meadow for one year because of budgetary difficulties caused by funding the incinerator application.	This is a matter for the local authority and not a relevant matter for our determination.
A number of people asked whether the Environment Agency had ever **refused a permit application** for an incinerator plant?	No – WID and IPPC set a clear regulatory framework which are known by applicants before making an application. Similarly applicants tend to have a good knowledge of the relevant environmental quality standards and the appropriate assessment techniques. Nevertheless, the Environment Agency carefully scrutinises every application before reaching a decision.
The Environment Agency's view that **road traffic** was a planning matter was challenged by some residents who cited the refusal of a permit at Oxted Sandpit on traffic grounds.	The Oxted Sandpit application is for an inert landfill site. The Application was originally refused on grounds of nuisance and hazard in relation to off-site traffic, but that decision was over-

Response Received from individual members of the public	
	turned on appeal. The Environment Agency took into account offsite traffic issues in this situation under Paragraph 5 of Schedule 10 to the EPR and Article 8 of the Landfill Directive 1999/31/EC. There is no comparable requirement under IPPC or WID. The EPR have since been amended to clarify that off site traffic for landfills is not a matter for the Agency.
The **safety risk assessment** produced by the dockyard has caused concern amongst local people because it quotes a number of separation distances between the dockyard facilities and the incinerator which are protective of their safety. However local people are concerned because the distances from the incinerator plant to housing is much smaller. The nearest residential property is 62m from the plant and there are approximately 450 dwellings within 250m. Local people therefore feel their safety is being compromised, in particular the risk of a boiler plant explosion of a catastrophic failure of a turbine blade. The dockyard risk assessment describes a safe distance of 320m for a concrete clad structure and 83m for a metal clad structure to protect against a boiler explosion.	Boiler explosion is an extreme event and the likelihood of such an event from a properly managed and maintained system is remote. Boilers are covered by statutory codes on their design, maintenance and operation. These statutory codes are issued under the Health and Safety at Work Act for which the competent authority is the Health and Safety Executive (HSE). We have consulted with the HSE on the permit application and have received no comment in response. Although the closest residence to the incinerator building is 62m, the boiler is located on a part of the site which is further away from these residential buildings than the 83m safe screening distance used by the MOD for their assessment. Ultimately, location is a land use issue and so is a matter for the planning authority to consider when deciding to grant planning permission.
Concern was expressed about the Environment Agency's treatment of alleged **tritium and deuterium** leaks into the Tamar from the dockyard.	This is a matter for the Environment Agency's regulation of the dockyard. There are no emissions to water from the incinerator other than clean uncontaminated rainwater and there is no abstraction of water from the dockyard. There is therefore no mechanism for emissions to water from the dockyard to impact on the incinerator or vice versa.

Response Received from individual members of the public	
Some correspondents questioned the range of **waste types** and the restrictions (or lack of restrictions) on a number of categories of waste. A number of people referred to the lack of pre-sorting in residual municipal waste the possible inclusion therefore of rogue wastes (e.g. low energy light bulbs, or asbestos in building wastes).	Residual municipal waste will contain small amounts of material, which if separately collected would be considered hazardous. Whilst pre-sorting would assist removing some of these materials, waste collection authorities may prefer to make investment in source segregation and ultimately this is a matter for them. In any event, we are satisfied that the incinerator has been designed and will be operated such that it can receive and treat the wastes listed in the permit. Asbestos removal is tightly regulated through Health and Safety legislation and other waste management controls and so is unlikely to be present in building wastes.