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

Decision document recording the decision making process

The Application reference number is	**EPR/LP3030XA/A001**
The permit number is	**EPR/LP3030XA**
The Application was duly made on	**06 April 2009**
The Applicant and operator is	**Viridor Waste Management Ltd**
The Installation is located at	**Cardiff EfW Facility** **Trident Park** **Glass Avenue** **Ocean Way** **Cardiff**

Structure of this document

Purpose of this document

This sets out our final decision.

The decision document explains how the applicant's application has been determined and why the specific conditions in the permit have been included. It is a record of the decision-making process to show how all relevant factors have been taken into account in reaching our position. Unless the decision document specifies otherwise we have accepted the applicant's proposals.

The permit contains many conditions taken from our standard non-landfill permit template (version 3). We developed these conditions in consultation with industry having regard to the legal requirements of the Environmental Permitting Regulations 2010 (SI 2010 no. 675) (the EP Regulations) and other relevant legislation. This decision document does not include an explanation for these standard conditions. Where they are imposed we have considered the application and accepted the details are sufficient and satisfactory to control that aspect of the operation. This decision document does, however, provide an explanation for the use of alternate conditions where our permit template allows for two or more options. Emission and monitoring compliance levels and any additional conditions that have been imposed in order to take installation-specific factors into account are explained.

In this document the terms applicant and operator are interchangeable. This is because the conditions of the permit refer to the operator and this is what the applicant will become once the permit is issued.

Summary of the decision

We have reached a final decision to issue a permit for the operator, subject to the conditions in the permit. We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

In addition to the requirements of the EP Regulations, the Agency has carefully considered the applicable requirements of the Waste Incineration Directive (WID) and the Integrated Pollution Prevention and Control Directive (IPPCD) and is satisfied that the permit ensures that these will be complied with. The requirements of the WID and the way in which these have been delivered by the permit are set out in Annex 1, whilst the IPPCD is addressed in the body of this document.

All emission limits and operational controls are considered to represent the use of Best Available Techniques (BAT). It is not considered that any site specific circumstances require the imposition of standards that are stricter than those associated with BAT.

Part A : GENERAL ISSUES

A1 Administration

This section includes administrative information relating to the application and information about the applicant and the installation.

The application was duly made on 06 April 2009. Consultation was carried out in accordance with the EP Regulations, our own Public Participation Statement and our own Regulatory Guidance Series Note Number 6 for Determinations involving Sites of High Public Interest. CD's of the application were provided to the Agency by the applicant and these were made available to the public on request.

A copy of the application, requests for further information, the applicant's responses and any other relevant information used in the determination process has been placed on our Public Register and sent to Cardiff City Council for its Public Register. Electronic copies of the requests for further information and the applicant's responses were made available to the public on request.

The Operator has not made a claim for commercial confidentiality. We have not received any information in relation to this application that appears to be confidential in relation to any party.

The Agency sent copies of the application to the following bodies with which we have "Working Together Agreements":

Cardiff Council (Environmental Health and Planning Departments)
Food Standards Agency
Countryside Council for Wales
Cardiff Local Health Board
Welsh Water Plc
Health & Safety Executive

The application was advertised in the South Wales Echo on 07 May 2009, inviting public comment and providing an extended period of 45 days for responses to this notification.

The Agency also undertook a programme of extended consultation on the application by holding public surgeries at local venues in Cardiff on 15 June 2009 and 06 July 2009. Local residents and members of the public were invited to attend to discuss the proposals and raise concerns. Written comments were invited and accepted by the Agency. The comments received are summarised in Annex 4 and we have taken these into consideration as described in Annex 4 in producing our draft determination.

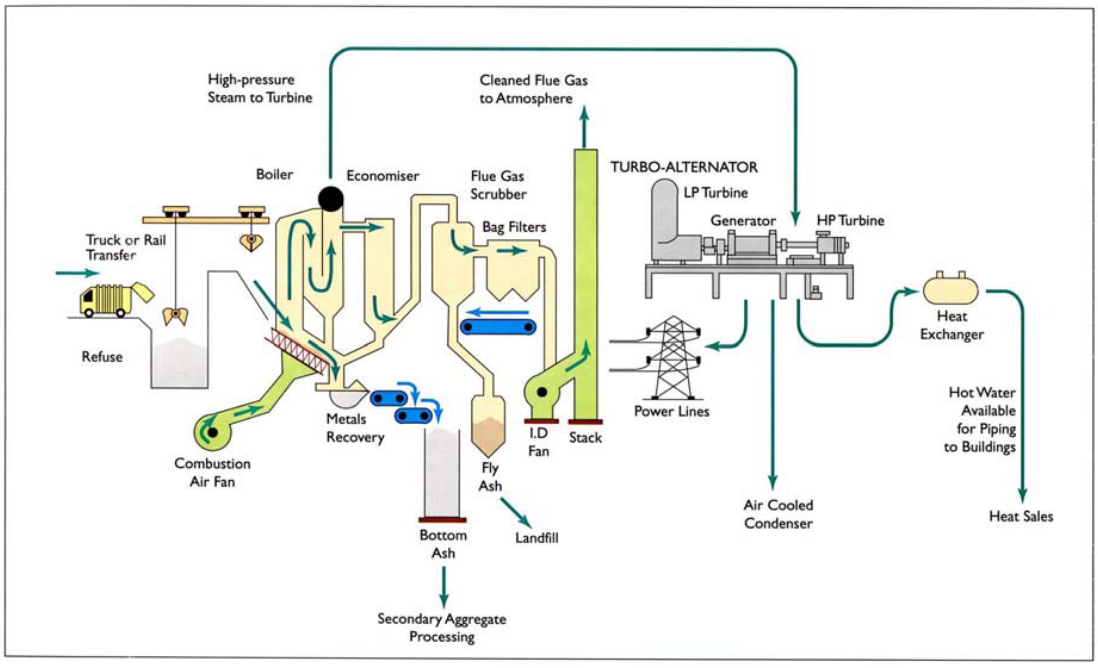
We put our draft decision before the public for comment in the form of a draft permit together with an explanatory document. The public has been provided with all the relevant information, including the original application and

additional information obtained subsequently together with two separate opportunities to comment on the application and its determination.

A2 Description of the installation

The Installation is regulated under the EP Regulations because it meets the definition of incinerator as described in Schedule 1, Part 2, Chapter 5, Section 5.1, Part A(1)(c) of the Regulations, i.e. “The incineration of non-hazardous waste in an incineration plant with a capacity of 1 tonne or more per hour.”

The main purpose of the activity at the Installation is to burn non-hazardous commercial, industrial and municipal waste and to recover energy by producing electricity for export to the National Grid and by supply of heat energy to potential off-site local consumers. The Installation includes two incineration lines and associated waste reception and storage, raw material reception and storage, waste, fuel and air supply systems, boiler, facilities for the treatment of exhaust gases, on-site facilities for handling and storage of residues and waste water, turbine for the generation and supply of electricity. A simplified process diagram of the proposed incineration process is provided below.



The main features and proposed process design of the installation are summarised as follows:

Waste will be delivered to the facility in covered vehicles or containers in order to ensure that waste does not get blown out of them during delivery.

Once on site the waste delivery vehicles will pass to the weighbridge area, where the vehicles are weighed and relevant data is gathered - including origin of vehicle, origin and nature of waste, tonnage, date and time. Unique identification cards will be given to each vehicle or load. The only pre-

treatment of waste will be shredding to reduce the size of bulky items (this takes place adjacent to the waste bunker). Recyclables will have been removed from the waste at the household level or at the intermediary recycling centre.

The installation is comprised of two separate incineration lines, each having a nominal capacity of 22 tonnes/hour, based on a typical input waste net calorific value (CV) of 9.3 MJ/kg. This equates to a total annual throughput of 350,000 tonnes for the plant, based on 7950 operational hours per year.

Following waste acceptance at the weighbridge area, the vehicles will move to the tipping hall where their load is discharged into the waste storage bunker. A hydraulic powered grab will be used to mix and move the waste to ensure a good consistency and to prevent the development of anaerobic conditions and minimise odour generation. In order to prevent odour escaping from the plant, the tipping hall will be fitted with roller shutter doors, which will shut during non-delivery periods, and will be under negative air pressure as the combustion air for the incinerator line will be drawn from the hall. In this way, potentially odorous air that might be released from the waste material will be fed back into the incineration process.

Any bulky non-combustible waste will be removed from the bunker using the grab and transferred to a skip before being sent for disposal or recovery. Any bulky combustible waste items will also be removed from the bunker for processing through the onsite shredder, prior to re-introduction to the process.

The grab will also be used to load waste into the waste hopper, from where the waste is directed into the furnace via a feed chute. A hydraulic ram will be used to deliver the waste from the feed chute to the combustion grate.

Waste charging will be interlocked with furnace conditions so that charging can not take place unless the minimum required operating conditions are present, i.e. a temperature of at least 850°C and oxygen content of at least 6%. The waste charging system will be air tight and the fan control system will respond to changes in furnace pressure to ensure that a negative pressure is maintained to prevent fumes from escaping or excess air flow. A damper arrangement will be in place between the waste hoppers and chutes, which will remain open during normal operation and closed during start-up and shut-down. During normal operation the waste chute will remain full of waste in order to create a seal between the combustion chamber and the outside air, preventing any backflow of combustion gases. An alarmed level detector will be used to continuously monitor the level of waste in the chute.

The facility will use the Martin moving grate system, which is an inclined reverse acting grate, consisting of steel alloy bars at an angle of 26°. The moving grate system is a proven incineration technology that is capable of burning a broad range of waste calorific values, which has been used in over 200 incineration plants world-wide.

Primary combustion air will be supplied to the furnace from under the grate. Under-fire air pressure and oxygen content will be maintained by control of the combustion air fans and dampers, which will enable independent air control to different sections of the grate. Each incineration line will have one primary and one secondary air fan. Secondary combustion air will be injected

into the combustion chamber above the grate using carefully positioned nozzles in order to achieve turbulent mixing of the combustion gases and promote complete combustion.

The optimal primary and secondary air input regime will be confirmed by computational fluid dynamics (CFD) modelling during design. Gas temperatures will be continuously monitored and recorded. Audible and visual alarms will be triggered in the Control Room if the temperature falls below 850°C.

Each combustion chamber is provided with an oil-fired auxiliary burner, which will be operated during times of start-up and shut-down, or automatically whenever the temperature falls below 850°C at the 2 second point, in order to maintain the required incineration temperature. It is anticipated that these burners will operate for minimal periods as the plant is designed for continuous operation.

Hot gases from each furnace will pass to a boiler to raise steam, which will be used to drive a common steam turbine and generate electricity. The high pressure steam from each boiler unit will be used for electricity generation in the turbine, however once the potential off-site consumers of heat energy have confirmed their demand, the turbine design will be finalised for optimum energy efficiency. The facility will have the capability to typically generate approximately 20MW of electricity and a further 50MW of steam heat energy for export. Waste heat recovered from the low pressure steam exiting from the turbine will be used to heat the boiler feed water and combustion air. The system will be engineered in such a way that the low pressure steam exiting from the turbine can also be exported for use as a lower grade heat source, should a customer be found for it. Unutilised steam will be cooled and condensed using air-cooled condensers prior to return to the boiler feed system.

Each furnace will be fitted with an independent dry urea injection system in order to reduce the facility's emissions of oxides of nitrogen (NOx) to air through selective non-catalytic reduction (SNCR). A dry flue gas treatment system will be used to neutralise acid flue gases by the injection of powdered hydrated lime (calcium hydroxide) into the reaction chamber. Activated carbon will also be injected into the flue gases in order to help reduce the concentrations of heavy metals and dioxins in the combustion gases emitted to air. Bag filters will be used to separate out the resulting particulate matter from the cooled and treated gases.

The installation will have twin 90m flue stacks located within a common windshield, from which combustion gases will be released to air. The stacks will be equipped with a Continuous Emissions Monitoring System (CEMS). The CEMS will continuously monitor particulate matter, oxides of nitrogen (NOx), sulphur dioxide (SO_2), carbon monoxide (CO), TOC (total organic carbon in the form of volatile organic compounds), hydrogen chloride (HCl) and ammonia (NH_3) in the combustion gases in order to ensure that the permit emission limits are complied with.

Residue from the bag filters (the flue gas treatment (FGT) or otherwise known as air pollution control (APC) residues) will contain heavy metals and is likely

to be classified as hazardous waste. It will be transferred via a sealed system to a silo, from where it will be transferred via a sealed connection to a vacuum road tanker for removal from the site. The sealed systems will prevent the release of these residues during storage and handling.

A Distributed Control System (DCS) will be installed to allow the operator to control and monitor all process areas of the facility and observe the status of the plant. Conditions within the furnace and boiler will be controlled in order to ensure sufficient combustion of waste and minimisation of emissions, such as particulates, VOCs, polycyclic aromatic hydrocarbons (PAHs), dioxins and furans etc. An infra-red pyrometer will be installed to monitor flue gas temperature. The furnace will be controlled in order to ensure that the bottom ash contains no more than 3% total organic carbon (TOC). The bottom ash and collected grate siftings will be quenched and handled by the ash discharger unit. The ash is fed through the unit by a mechanical ram and is cooled/quenched using a water-filled trough, from where it is conveyed to a dedicated ash storage area.

Sources of waste water will include boiler drains; steam circuit drains; regeneration of the demineralisation plant; wash-down water from process areas; ash discharger overflow; deaerator overflow; and rainwater run off from potentially contaminated areas of the site. These will be recovered by utilisation as quench water in the bottom ash discharger unit. Uncontaminated surface water will drain to the external surface water drainage system via on-site attenuation ponds, an interceptor and isolation valves. (as detailed in Section C6).

A3 Operator competence

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. The decision was taken in accordance with our Regulatory Guidance Series Number EPR 1 Understanding the Meaning of the term Operator.

The operator is the legal entity that controls the installation, being incorporated as Viridor Waste Management Limited at Companies House. The operator has stated in the application that an externally audited ISO 14001 certified Environmental Management System (EMS) will be implemented at the installation. We are satisfied that they will be able to operate the installation so as to comply with the conditions included in the permit.

A4 OPRA profile

We are satisfied that the Operator and Pollution Risk Appraisal (OPRA) profile adjusted and confirmed prior to duly making the application, remains accurate following the determination of the application.

The OPRA score of 303 will be used as the basis for subsistence and other charging. In accordance with our OPRA Scheme however, the operator's OPRA profile for the installation may change over time.

Part B: THE INSTALLATION AND ITS MANAGEMENT

B1 General Management

Permit condition 1.1

Based upon the information submitted in the application, we are satisfied that appropriate management systems and management structures will be in place for this installation and that sufficient financial, technical and manpower resources are available to the operator to ensure compliance with all the permit conditions.

Viridor Waste Management Ltd has developed an Environmental Management System that meets the requirements of BS.EN.ISO 9001:2000 and BS.EN.ISO 14001:2004 and has obtained third party certification. The environment management system will be adopted at the proposed facility prior to operation and this will be externally audited subsequently to enable certification for the site.

B2 Accidents that may cause pollution

Permit condition 1.2

Based upon the information submitted in the application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are minimised.

The site is not subject to The Control of Major Accident Hazard Regulations (SI 743 1999) (COMAH).

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Table 2-1 in Section 7 of the application identifies potential accident situations and describes their likelihood, potential consequences and mitigating actions, but only in general terms. Pre-operational condition PO05 is set in the permit requiring the operator to provide the Environment Agency with a copy of the site EMS prior to the commencement of commissioning. The accident management plan will need to form an element of the submitted site EMS detailing the site specific accident procedures (Emergency Plan), a summary of the risk assessment methodology and contingency procedures that are developed for the plant. The approved plan will then have to be implemented in accordance with condition 1.2.

B3 Energy efficiency

Permit condition 1.3

B3.1 Scope of considerations

The efficient recovery and use of energy at the Cardiff EfW facility is an issue which has a number of facets, and one which impacts not only on the determination of the EPR permit, but also on the planning application which is

being determined by Cardiff City Council. The following aspects of energy efficiency have been considered:

1. The efficient use of energy within the proposed installation, which is a normal aspect of all EP permit determinations. This issue is dealt with in this section.

2. The extent to which the proposed facility meets the requirements of Article 6(6) of the Waste Incineration Directive (WID), which states that heat "shall be recovered as far as practicable". These are relevant considerations for the EPR determination process, and these are covered in this section. Some aspects, in particular the potential for use of the waste heat, are largely influenced by planning considerations such as the siting of the plant. Where the WID impinges on the planning process in this way, we have made comments to Cardiff County Council (the planning authority) in our role as a statutory consultee for the planning application.

3. The combustion efficiency and energy utilisation of different design options for the incinerator are relevant considerations in the determination of BAT which includes the Global Warming Potential of the different options. This aspect is covered in the BAT Assessment which is reported in section C7.1.2 of this Decision Document.

B3.2 Use of energy within the proposed installation

Based upon 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 site in order to increase the energy efficiency of the facility such as the use of variable speed drives, preventative maintenance of key equipment and plant insulation to reduce heat losses. Further efficiency measures will include the recovery of waste heat/steam from the turbines in order to pre-heat the combustion air and boiler feedwater.

The main form of energy consumed within the process activities is electricity to drive air/flue gas transfer fans and pumping systems for boiler and other water transfers. Fuel oil will be imported and utilised within the Installation for start-up, shutdown and maintenance of temperature within the post combustion chambers of each line when required.

Data provided by the Operator in the H1 assessment submitted as part of the application indicates that the electrical specific energy consumption (SEC) of the installation is predicted to be 85 kWh per tonne of waste processed. The BREF indicates that the electrical SEC for larger scale municipal waste incinerators is typically in the range 60 - 200 kWh/tonne. The predicted plant SEC performance therefore compares favourably with the most efficient extent of this range.

The Environment Agency's Incineration of Waste sector guidance document EPR S5.01 (SGN) states that indicative BAT for municipal waste incineration where electricity only is generated is that some 5-8 MW of electricity should be recoverable per 100,000 tonnes of waste burned. In Section 10 3.26 of the Application, the applicant has indicated that the plant will typically produce 6.5 MW of electricity per 100,000 tonnes of waste burned (based on an input waste calorific value (CV) of 9.3 MJ/kg). However, this calculation is based on a quantity of high grade heat energy also being made available for export from the installation in parallel with electricity production. In Section 9 of the Application, the applicant indicates that the plant would be capable of producing 30 MW of electricity on an 'electricity only' basis. The Cardiff EfW plant is therefore within the indicative BAT range for an 'electricity only' plant. There are no site specific considerations that require the imposition of standards beyond indicative BAT and so the Agency accepts that the proposals are BAT.

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. Where waste heat currently cannot be recovered, provision for future installation, such as by including tie-in points for a heat distribution network at the outlet of the power generating unit, should be made.

The operator has undertaken a detailed review of potential heat users that are within practical proximity (5 km) of the installation (Section 9, Heat Plan - of the Application) so that opportunities for CHP development can be maximised. As a result of the study undertaken, the applicant has made direct contact with several public and private organisations to further evaluate the opportunities for wider CHP development. Issues relating to the provision, cost and maintenance of the necessary distribution infrastructure have been raised during subsequent exchanges, along with unit cost and supply contract terms. Irrespective of the finalisation of any specific CHP arrangements, there is provision within the design of the steam turbine to extract low grade steam for a district heating scheme, and Permit Condition 1.3.2 ensures this will be maintained.

B3.3 Compliance with Article 6(6) of the WID

The previous section describes our assessment of energy utilisation within the proposed process design. The Environmental Permitting Guidance on the WID (2008) 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 Cardiff EfW proposal includes an element from all of the options (a) to (d), albeit that the use of waste (exhaust) heat is restricted to process heating, i.e. by using recovered waste heat to pre-heat the boiler feed water and air.

It is considered that within the constraints of this proposal at this site, heat will be recovered as far as practicable, and therefore that the requirements of Article 6(6) are met, so far as the Agency's remit under the EP Regulations is concerned.

The WID guidance also states that opportunities to maximise the potential for heat recovery should be considered at the early planning stage, when sites are being identified for incineration facilities. In its role as a statutory consultee on the planning application, the Agency ensured that energy utilisation was considered by the planning authority though the location of the facility is ultimately a matter for the planning authority and not one for this determination.

B3.4 Permit conditions concerning energy efficiency

The operator fully recognises the potential to provide surplus heat to local businesses and/or nearby public organisations and facilities. The 'Heat Plan' provided in Section 9 of the Application records the scope and detail of the study and evaluation undertaken to date. Discussions with a number of organisations are ongoing, although no firm commitments or contracts have been made at this stage.

Conditions 1.3.2 and 1.3.3 have also been included in the permit, which requires the operator to review the options available for heat recovery on an ongoing basis and to provide and maintain the proposed steam / hot water pass-outs.

The operator is required to report energy usage and energy generated under condition 4.2 and Schedule 5 of the permit. 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 MSW burned per year, this will enable the Agency to monitor energy efficiency at the installation and take action if the energy efficiency is not considered acceptable.

B4 Efficient use of raw materials

Permit condition 1.4

Based upon the information submitted in the application we are satisfied that the appropriate measures will be in place to ensure the efficient use of raw materials and water.

The operator is required to report with respect to raw material usage under condition 4.2. and Schedule 5 consumption of lime, activated carbon and urea used per tonne of waste burned. This will enable the Agency to assess

whether there have been any changes in the efficiency of the air pollution control plant, and the operation of the selective non-catalytic reduction (SNCR) of oxides of nitrogen (NOx). These are the most significant raw materials that will be used at the installation, other than the waste feed itself (which is addressed by Section C1). The efficiency of the use of auxiliary fuel will be tracked separately as part of the energy reporting requirement under condition 4.2.1.

The system of SNCR abatement proposed by the applicant for reduction of NOx at the installation will use dry urea as the reagent. An alternative reagent to urea is ammonia, and the SGN states that the use of either reagent can be BAT. Dry urea has been chosen by the operator as the preferred reagent because it will be easier and safer to handle at the installation than ammonia. Emissions of NOx, nitrous oxide (N_2O) and ammonia from the abatement process will be minimised by the optimisation of the position of the urea injection nozzles in the furnace, maximising reaction efficiency in order to ensure that overdosing of reagent is avoided. Urea dosing efficiency will be further enabled via the continuous monitoring of ammonia and the periodic monitoring of nitrous oxide emissions as required through Table S4.4 in Schedule 4 of the permit.

The operator has proposed the use of dry lime reagent at the facility to minimise acid gas emissions. The SGN identifies wet, semi-dry and dry techniques as potential treatment options for acid gas abatement. The SGN also identifies three reagents that may be considered BAT for an individual installation: lime ($Ca[OH]_2$), sodium hydroxide and sodium bicarbonate, and details some advantages and disadvantages for each abatement technique and associated reagent. The use of a dry lime abatement technique in the system was considered to be BAT for the proposed facility as the use of bicarbonate has not been proven at large scale plant, such as the proposed Cardiff EfW facility, and reagent costs for it are significantly higher. The effluent resulting from the use of a wet sodium hydroxide system would require additional effluent treatment and associated ETP sludge disposal. The Agency is satisfied that the selected raw material is BAT.

The application states that the dry lime abatement system will include the collation and recirculation of partially spent reagent residue from the bag filter system. Partially spent reagent residues from the bag filter system are captured and collected in a dedicated storage silo, these partially spent residues are then blended with a proportional amount of fresh lime reagent prior to being fed back into the abatement reaction duct on a continuous loop basis. During operation, the operator will monitor emissions of HCl and SO_2 both upstream of the reaction duct and at the flue gas exit, in order to optimise the dosing rate of reagent that is injected into the flue gases and minimise the potential emissions of acid gases.

Improvement condition IC3 of the permit requires the operator to submit to the Agency a post commissioning report giving details of the optimisation of emission abatement systems including dosing rates. This will include optimising the dosing of reagents used in the NOx, acid gas and heavy metal abatement systems, ensuring that these raw materials (reagents) are used efficiently. The optimisation of the abatement systems will not involve any

fundamental change to the design of the plant or the abatement systems, which has been reviewed in Section C7.

Table S4.4 of the permit requires the operator to monitor N_2O emissions quarterly in the first year and every 6 months thereafter, and to monitor emissions of ammonia on a continual basis (in order to optimise the abatement of NOx through the injection of urea and to minimise ammonia slip).

The operator indicated in the application that the auxiliary burners for each combustion unit would be fuelled on oil. In the additional information provided on 17/06/10, the operator confirmed that the auxiliary burners will be fuelled on oil with a sulphur content below 0.1%, in compliance with the Sulphur Content of Liquid Fuels Regulations (2007). This will be a condition of the permit (Condition 2.3.2/Table S3.1).

Water consumption within the facility is predominantly associated with the supply of make-up water to the boiler systems (104 m^3/day). Boiler blow down water and the regeneration effluent from the boiler feed demineralisation plant will be utilised in the bottom ash quench tanks of each incineration line. Rainwater will be harvested where practical for use in the ash quench process to minimise raw water consumption. The Applicant estimates that raw mains water usage will be 122 m^3/day.

The operator has committed to undertaking a detailed water usage audit within two years of permit issue.

Condition 1.4.1 requires that the Operator uses raw materials and water efficiently and that subsequent minimisation audits are undertaken on at least a regular 4 yearly basis.

B5 Avoidance, recovery and disposal of wastes produced by the activities

Permit condition 1.5

The operator has provided a Residue Management Plan as Section 11 of the Application. Within this plan, they have identified that the principal waste streams that will be produced by the proposed facility are bottom ash, flue gas treatment residues and recovered ferrous and non-ferrous metals.

The operator has stated in the application that bottom ash from the facility will be relatively inert and classified as non-hazardous waste. Within the Residue Management Plan they have identified potential off-site recovery opportunities for this waste stream after further treatment, either by utilisation as a primary aggregate substitute in concrete construction materials manufacture, or as a sub-base material in road construction. The Environment Agency recognises that most incinerator bottom ash (IBA) is likely to be classified as non-hazardous waste. However, IBA is classified on the List of Wastes as a 'mirror entry', which means it could potentially be categorised as a hazardous waste if it is found to possess a hazardous property.

The operator recognises that Air Pollution Control (APC) residues are classified as hazardous waste and therefore must be sent for disposal to a

landfill site permitted to accept hazardous waste, unless it is sent to an appropriately licensed facility for treatment. Bottom ash and APC residues will be separately collected and stored within the installation, as required by condition 2.3.12. This will enable appropriate recovery or disposal arrangements for these materials.

Metals will be separated from the bottom ash stream by electromagnetic and eddy current separators prior to its collation in the on-site storage facility. The segregated metals will be collected and stored separately prior to being sent off-site for recovery by an appropriate reclamation company.

In order to ensure that the bottom ash and APC wastes are adequately characterised and sent to appropriate disposal or recovery facilities, pre-operational condition PO04 requires the operator to provide the Environment Agency with a written plan for approval detailing the ash sampling protocols for the APC residues and bottom ash. Table S4.5 of the permit requires the operator to carry out an ongoing programme of monitoring for the bottom ash and APC residues.

Primarily, waste production will be avoided by achieving a high degree of burnout of the ash in the furnace, which results in a material that is both reduced in volume and in chemical reactivity. Condition 3.1.2 and associated Table S4.5 specifies residual total organic carbon (TOC) in bottom ash of 3%. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces.

Based on the information submitted in the application we are satisfied that the appropriate measures will be in place such that waste production will be avoided as far as possible, and where waste is produced it will be recovered unless technically or economically unfeasible.

We are satisfied that the operator's justification for their proposed waste disposal option shows that such waste that does arise from the installation that cannot be recovered will be disposed of using a disposal method that avoids or reduces any impact on the environment. Standard condition 1.5.1 of the permit will ensure that this position is maintained.

B6 Site Security

Based upon 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.

B7 Multiple operator installations

This is not a multi-operator installation

B8 The permitted activities

Permit condition 2.1

We have determined that the installation comprises the following activity listed in Part 1 of Schedule 1 to the EP Regulations:

- 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

and the following directly associated activity:

- the generation of electricity using a steam turbine

Under the provisions of the EP Regulations, the definition of an incineration plant includes all those activities listed in Article 3 of the Waste Incineration Directive (WID). Therefore, in accordance with Article 3, the listed incineration activity 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."

By virtue of this definition, all the activities which would normally be categorised as directly associated activities for EP purposes (e.g. air pollution control plant, ash storage bunker) are included in the listed activity definition.

The activity comprises a single installation because the incineration plant and the steam turbine are successive steps in an integrated activity.

B9 The site

Permit condition 2.2

The operator has provided a plan which we consider is satisfactory, showing the site of the installation and its extent. A plan is included in the permit at Schedule 2, and the operator is required to carry on the permitted activities within the site boundary.

Part C: OPERATIONS AND RELEASES

C1 Operating techniques

Permit condition 2.3/Table S1.2

Through Condition 2.3 and Table S1.2 of Schedule 1 of the permit, we have specified that the applicant must operate the installation in accordance with the following descriptions provided in his application.

Description	Parts Included	Justification
Application	The details provided in Section 7 (but excluding Appendix 2) and Section 10 (including Appendices 1 to 4)	The details given in the application provide techniques for operation that are BAT.
Response to Further Information Request No 3, dated 17/06/10	Response to question 2 relating to bag filter system operation.	Supplements detail of Operational Techniques provided in the application.

We have reviewed the operational techniques with reference to the waste incineration Sector Guidance Note (SGN) – The Incineration of Waste (EPR 5.01), and the associated European Commission Reference Document on the Best Available Techniques for Waste Incineration (BREF). We accept that the techniques proposed in the application are considered to be BAT for the Installation.

The significant operational techniques for control of the installation are summarised below, with the BAT options appraisal for furnace type selection and emission control techniques and equipment considered further in section C7.1.

C1.1 Waste delivery and storage

Waste will be delivered to the site predominantly by refuse collection and bulk transport vehicles, which will be covered or otherwise contained so that waste is not blown out during delivery. Once on site the waste delivery vehicles will pass to the weighbridge area, where the vehicles are weighed and relevant data is gathered prior to acceptance and authorisation to discharge the load. Delivery will be to the waste bunker inside the fully enclosed reception hall, the doors of which will be closed when waste deliveries are not entering the building. The reception hall will be maintained under a negative pressure by the continuous extraction of air from the reception hall to feed the combustion process. This will minimise the risk of odours, dust or litter escaping from the building. Waste in the bunker will be regularly mixed by a hydraulic grab cranes to provide homogeneous feed and maintain aerobic conditions to minimise the potential production of odorous gases such as H_2S and NH_3 as a result of anaerobic bacterial activity. The grab cranes will also enable bulky items to be removed for shredding or further segregation if they are unsuitable for combustion.

C1.2 Waste feed to the combustion furnace

The grab cranes load mixed waste from the bunker into the feed hopper of each furnace unit. The waste is then conveyed via a chute and steel shut-off door onto the waste feeder at the head of the moving grate section of the furnace. The grate and boiler system have been designed and are characterised by a firing capacity diagram that defines the operational envelope for the CV of the input waste and associated feed rate of waste to the furnace, and the relative heat input to the boiler system. The plant will be equipped with an integrated Distributed Control System (DCS) which will monitor a range of process variables, and provide feedback loop control for other plant control systems. The feed chute shut-off door and waste feed ram are controlled by this system, and this enables waste feed to be controlled and furnace conditions to be maintained within the operational envelope of the firing capacity for the plant.

C1.3 Combustion control techniques

Article 6 of the WID requires that all waste incineration plants are designed and operated in such a way that, even under the most unfavourable conditions, the combustion gases are raised to a temperature of 850°C for two seconds. It also requires that this temperature reading is measured near to the inner wall of the combustion chamber, or another representative location.

The operator has confirmed in the application that the operating temperature of the plant, after the last injection of combustion air, will be at least 850°C, that the residence time of gas at this temperature will be at least 2 seconds and that the temperature measurement will be made near the inner wall of the furnace.

The SGN states that BAT requires sufficiently oxidising conditions to provide for good combustion and suggests that the BAT oxygen concentration is 6%. The operator has stated in the application that combustion conditions at the proposed facility will have an oxygen content of at least 6% (by volume).

WID requires that plants are operated in order to achieve a level of incineration such that the slag and bottom ash have a Total Organic Carbon (TOC) content of less than 3%. The operator has stated in the application that the plant will be designed to achieve a carbon in ash level of less than 3%. The operator stated in the application that the carbon content of the bottom ash will be monitored during plant commissioning and operation. Pre-operation condition PO04 requires the operator to provide the Agency with an ash sampling protocol prior to the operation of the facility.

During the design of the furnace and boiler, CFD (Computational Fluid Dynamics) modelling will be used to determine the configuration and dimensions of the furnace in order to optimise the combustion process, the mixing and turbulence of air/gases in the furnace in order to minimise emissions and optimise ash burn out and optimisation of the location of the SNCR reagent injection nozzles and temperature sensors. The location of secondary air nozzles will be determined by the experience provided by the design contractor and the results of large-scale laboratory tests. The CFD modelling allows the operator to predict the following:

- the temperature, velocity and thermal flux profiles in the furnace;

- the heat flux absorbed by the tubes and membrane walls in order to determine the evaporation and the natural circulation in the tubes;
- the temperature of the refractory materials to study their thermal strength;
- the boiler behaviour under different combustion conditions (fuel type, excess air, air temperature, primary/secondary air ratios);
- the boiler performance at part load; and
- the influence of boiler fouling on the thermal transfer to the membrane walls.

A Distributed Control System (DCS) will be installed at the plant, which will monitor, control and optimise the plant and allow the operator to view the condition and status of the plant. An infra-red pyrometer will be used to monitor the furnace temperature and the temperature readings will be fed back to the combustion control loop in the DCS. Other variables monitored for combustion control include load (steam flow) and excess air (% of combustion oxygen).

The furnace will be subject to CFD modelling as part of its design. Pre-operational condition PO01 requires a report on the results of the CFD modelling to be sent to the Agency and IC2 requires the Operator to undertake a test programme to subsequently verify the results by measurement, in order to demonstrate that the WID requirements are met.

C1.4 Boiler Design

The WID sets an emission limit for dioxins and furans of 0.1ng/m3 and requires that dioxins and furans are monitored twice a year. These requirements have been implemented through the environmental permit for the facility.

The SGN also requires that dioxin emissions are minimised through the design and operation of the facility's boiler plant. The SGN states that in addition to maintaining a high combustion temperature in the furnace, a key technique for preventing dioxin formation is by maximising the rate of decrease of gas temperature in the boiler. The primary temperature zone of concern for dioxin reformation is between 450°C and 200°C. Minimising boiler deposits can also help to prevent the reformation of dioxins.

The application states that dioxin formation in the plant will be prevented by ensuring that the flue gas temperature exceeds 850°C for at least 2 seconds in the main combustion chamber, whilst ensuring that the residence time of flue gases in the low temperature sections of the boiler (e.g. the economiser) is minimised. This will be achieved by a progressive reduction in volume of the boiler passes so that, after leaving the main combustion chamber, the velocity of the gas increases through the boiler as a result of this.

The operator also confirmed that the following additional design features of the plant will help minimise the formation and de novo synthesis of dioxins where the flue gas temperature is in the range 200-450°C :

- The vertical design of the boiler will reduce stagnant and low gas velocity areas
- Reduction of precursor substances and complete burn-out in the post combustion chamber due to high residence time at high temperature (> 2 seconds at a minimum of 850°C)
- Reduction in the deposits on boiler tubes by use of vertical self cleaning panels in the second pass where the temperature is above the de novo synthesis region and efficient cleaning devices.
- Reduction of the surface temperature and therefore deposition of clinker due to the reduction of the flue gas temperature at the inlet of the convective bank.
- Control of the boiler outlet gas temperature normally below 200°C.

The Environment Agency considers that the design and operation of the proposed facility is BAT for minimising the formation of dioxins and furans. Dioxins and furans that are formed from the waste incineration process will be abated by the techniques detailed in Section C7.1 to ensure that the WID emission limit is met.

C1.5 Residue handling, segregation and storage

The main residue streams resulting from the process are Incinerator Bottom Ash (IBA), boiler ash residues, Air Pollution Control (APC) residues, the metal fraction segregated from the IBA and rejected feedstock items.

The Application states that a water quench wet system will be used for initial IBA collection prior to intermediate storage in a dedicated hall enclosed within the building. This has the advantage of minimising dust release during storage and conveyance operations. Boiler ash residues will be combined with the IBA in the dedicated enclosed intermediate storage area prior to this waste being removed from the site in covered transport vehicles.

APC residues will be conveyed from the bag filter abatement system via a sealed conveyor system to a dedicated storage silo prior to removal from the site in sealed transport vehicles.

The metal fractions segregated from the IBA will be stored in a separate storage area within the building prior to removal from the site for subsequent recovery.

Rejected feedstock items will be segregated and collated within a designated quarantine area of the reception hall prior to removal from the site for subsequent recovery or disposal.

The Application states that records will be kept of all wastes and reject materials produced and removed from the site.

The Environment Agency considers that arrangements for the handling, segregation and storage of wastes and residues are BAT for the Installation.

C1.6 Cooling system

There are three main types of cooling systems commonly employed at energy generation facilities for recovery and reuse of feed water used in steam generation in the boiler and turbine system. These are:

- once through direct water cooling;
- evaporative cooling tower; and
- forced draft condenser air cooling.

The Applicant has selected air cooling as the BAT cooling choice for the Installation for the following reasons:

- no liquid blow-down;
- evaporative cooling systems require the use of chemical treatment or biocides;
- there is no visible plume; and
- there is no water consumption.

Air cooled condensers do have the potential to create noise release. The Application contains (in Section 15 of the planning application EIA submitted as part of the EPR application) a background noise survey and predictive noise modelling for the proposed activities at the site. The survey and modelling considered a range of sensitive receptors surrounding the site. Noise levels from the operational activities have been assessed at these sensitive receptors and the applicant concluded that as they are significantly below existing background levels, the facility is not likely to give rise to any cause for annoyance.

However, pre-operational condition PO06 requires the operator to design and submit a detailed programme of noise monitoring prior to the commencement of any commissioning activities at the installation.

The Agency considers that air cooled condensers for the recovery of boiler feed water are BAT for the Installation.

Permit condition 2.3/Table S3.1

C1.7 Raw material and fuel specifications

We have 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	Maximum sulphur content of gas oil used will be 0.1% w/w, which is in accordance with the Sulphur Content of Liquid Fuels Regulations.

C1.8 Input waste specification

Article 4(4) of the WID requires that the Permit must list explicitly the categories of waste which may be treated. The Application contains an extensive list of wastes, coded by their European Waste Catalogue (EWC) reference number, which the Applicant considers may appear in the waste streams entering the Cardiff EfW installation and which the plant is capable of burning. All of the waste codes listed in the Application are categorised as non-hazardous commercial and industrial or municipal wastes.

Each waste type listed in the Application has been reviewed by considering factors such as:

- whether the waste is generally similar to the constituents and characteristics of mixed municipal waste;
- whether it is likely to have properties that are within the design CV range for the plant;
- whether it is likely to contain toxic contaminants and the likely fate of these in the incineration process; and
- whether there are likely to be any particular operational issues that may arise from burning of the waste.

As a result of this review, we have excluded the following wastes that were requested in the Application from the list of authorised wastes that are considered acceptable for treatment at the installation.

Waste code excluded	Description	Reason for exclusion
02 01 02	animal tissue waste	Should be directed for treatment in a designated Animal Carcass/Animal Remains incinerator (ACI) which is compliant with relevant Animal By-Products Regulations.
02 01 06	animal faeces, urine and manure, effluent, collected separately and treated off-site.	Likely to have high liquid content and low calorific value. Unlikely to constitute a solid waste format for suitable treatment in this specification plant. Primary treatment option should be anaerobic digestion or other primary biological treatment plant.
15 01 04	metallic packaging	No calorific value. Will simply increase 'metals' loading in exhaust stream and emissions from site, which will increase environmental risk and abatement plant loading and reduce capability. .
18 01 01	sharps (except 18 01 03)	These are all wastes from Human or Animal Health Care activities, and as such should be treated in a designated Clinical Waste Incineration (CWI) facility, where appropriate waste reception and storage arrangements are in place, and the process parameters of the incineration process suitably controlled.
18 01 02	body parts and organs including blood bags and blood preservatives	
18 02 01	sharps (except 18 02 02)	
19 10 04	fluff light fraction and dust (from the shredding of metal containing wastes) other than	This is likely to comprise swarf and dust with a high metallic content and therefore minimal calorific value. As for the metallic packaging

Waste code excluded	Description	Reason for exclusion
	those mentioned in 19 10 03	waste described above, it will abnormally increase the potential of metals emissions from the site and create abnormal loading on the abatement processes for metals releases.
19 12 02	ferrous metal	As above for metallic packaging wastes. Separately collected ferrous metal waste fractions or those resulting from mechanical treatment of upstream wastes should be routed to a metals recovery facility.

We have specified the permitted waste types, descriptions and quantities, which can be accepted at the installation in table S3.2 of Schedule 3 of the permit.

We have also reviewed the waste types requested in the application with consideration to the potential for alternative recycling, treatment or recovery opportunities. As result of this review, some of the waste types listed in table S3.2 are subject to further conditions such that they are only considered acceptable if:

- they are contaminated or can not be practically recycled or reused and would otherwise be destined for landfill; or
- where anaerobic digestion, composting or similar treatment is not a practical option; or
- where that waste stream is not practical for Recovery though agricultural or horticultural benefit or other similar means, and has a solid phase composition.

Pre-operational condition PO08 has been included in the permit, which requires the operator to submit a report to the Agency that details a waste acceptance procedure that will be implemented by the operator such that the above requirements are achieved during operation of the facility.

We are satisfied that the operator can accept the wastes contained in table S3.2 of Schedule 3 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) these wastes are likely to be in the design CV (calorific value) range for the plant and iii) these wastes are unlikely to contain harmful components that cannot be processed safely by the installation.

The installation will be designed, constructed and operated to achieve BAT for the incineration of the permitted wastes. The operating and abatement techniques proposed are BAT for incinerating these types of waste.

The WID defines capacity as ‘the sum of the incineration capacities of the furnaces of which an incineration plant is composed, as specified by the constructor, and confirmed by the operator, with due account being taken, in particular, of the calorific value of the waste, expressed as the quantity of

waste incinerated per hour.' The application states that the total nominal capacity is 44 tonnes per hour (both combustion lines), based on the average CV of the input waste being 9.3 MJ/kg. The Stoker Capacity Diagram included in Appendix 1 of section 10 of the Application more specifically defines plant capacity characteristics relative to waste quantity, calorific value and heat input. The plant has been designed to treat 350,000 tonnes of non-hazardous municipal solid waste per annum, assuming 7950 hours of annual operation. Table S3.2 restricts the plant to a maximum annual throughput of 350,000 tonnes of input waste material.

C2 Off-site conditions

Based on the information submitted in the application, we consider that it is not necessary to impose any off-site conditions.

C3 Improvement conditions

Permit condition 2.4

Based in the information in the application we consider that we need to set what are called "improvement conditions". In the case of a new Installation such as this, they are in fact conditions requiring measures to be undertaken which cannot be carried out before the grant of the permit (frequently to obtain operational information); they are not measures to improve matters at a later stage These are listed in Annex 2 and justifications for these are provided at the relevant section of the decision document. We are using these conditions to require the operator to provide the Environment Agency with details that need to be validated or confirmed during and/or after commissioning.

C4 Pre-operation conditions

Permit condition 2.5

Based on the information in the application, we consider that we do need to impose pre-operational conditions. These conditions are detailed in Annex 3 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 provided in the application have been adopted or implemented prior to the operation of the facility, and to provide additional information which was not available at the time of the grant of the permit, and was not necessary to obtain before the permit was granted.

C5 Closure and decommissioning

Based upon the information submitted in the application (Section 10, 3.33) we are satisfied that the appropriate measures will be put in place by the operator to enable secure closure and decommissioning of the installation. They have committed to producing a site closure plan once the detailed design of the site infrastructure has been completed. Pre-operational condition PO05 requires the operator to submit a copy of the site EMS prior to the commencement of

commissioning. The closure plan will need to form an element of the submitted site EMS and will have regard to the detail of the as-installed site infrastructure as required through PO07.

C6 Site Condition Report

The applicant has provided a Site Condition Report (SCR) which is in accordance with the Agency's H5 Guidance and includes sections 1 to 3 of the associated report template. The main elements of the report are as follows.

Site Setting, Layout and History

The site is located approximately 1.6 km to the south east of Cardiff City Centre and occupies 4.5 hectares of the 20 hectare Trident Park Development. The site and its surroundings previously formed part of the East Moors Steel Works which closed in 1978. Following reclamation, the site was subsequently occupied by Nippon Electric Glass (UK) Ltd which manufactured cathode ray tube components, until it ceased production in 2005. Roath Dock, part of the original Cardiff docks system lies approximately 150 metres to the south east of the site. The Celsa Manufacturing UK Ltd steel rolling facility lies 250 metres to the west of the site. The Cardiff Bay redevelopment area is approximately 750 metres to the south west of the site, and the Severn Estuary SAC/SPA/Ramsar habitat site is a similar distance to the south east of the site.

Site plans are included in the report showing the location of the site, the operational site layout and installation boundary, a process flow diagram and an indicative surface water drainage plan.
The majority of the site comprises made ground to a depth of up to 5 metres as a result of the historic activities at the site. The underlying solid geology is Mercia Mudstone at a depth of 12.5 to 15 metres, and this is overlain by a drift layer of marine and estuarine alluvium consisting of silty/sandy clays. The Mercia Mudstone is classified as a non aquifer and the site does not lie within a groundwater protection zone.

Intrusive site investigations were carried out by SLR Ltd in June 2008 to survey land quality and hydrogeology characterisation of the site. This included construction of 10 boreholes to establish groundwater sampling and monitoring and 20 trial pits to establish land contamination sampling and monitoring for a range of potential pollutant materials. The Preliminary Land Quality Risk Assessment indicated that the site has the potential for historic contamination and that the risks of impact new buildings construction and human health required further consideration.

The results of the soils chemical analysis and human health generic quantitative risk assessment have demonstrated that the soils on site do not contain levels of contaminants that exceed Human Health Generic Assessment Criteria. The risk assessment has also established that soluble sulphate and magnesium levels and groundwater pH constitute mildly

aggressive ground conditions in relation to concrete protection. This will enable construction materials and techniques for infrastructure at the site to be designed accordingly. Construction and development at the site will be subject to the conditions and control of any planning authorisation issued by Cardiff City Council. As a consultee to the planning process, the Agency will continue to work with the Council to ensure that any necessary further remediation is undertaken prior to the start of construction.

Proposed site design - potentially polluting substances and prevention measures

The operational areas of the site will be provided with impervious surfacing and concrete hard standing. All tanks at the installation will be double skinned or bunded to contain 110% of the capacity of the tanks.

The site report provides a summary of the above ground storage tanks, detailing their contents, capacity and construction. Boiler water treatment chemicals will be stored in bunded tanks located indoors within the demineralisation and water treatment area. Acid will be stored in bunded containers. The raw materials silos (lime and activated carbon) will be located indoors and urea prills will be stored in a dedicated indoor storage room.

The waste storage bunker and ash handling areas will be designed as liquid retaining structures. Bottom ash will be stored in an internal designated storage area, enclosed with sealed concrete hardstanding and contained drainage. The APC residues will be stored in a silo in a designated area.

The site will operate a management system to ISO14001 and training will be carried out and equipment provided to minimise the potential environmental impact of any accidents and spillages.

Drainage from the process systems, wash-down waters from process areas and potentially contaminated water from roads and external areas of the installation will be routed to the reuse water tank. This waste water will be reused in the process. The pit will be concrete lined and will have a capacity of around 120 m^3.

Uncontaminated site surface water will first be collated to a surface water attenuation pond. This will have a controlled outflow to a second surface water holding pond. A bypass oil separator will be installed in the outflow from this holding pond, to remove any possible organic contaminants and suspended solids from the drainage water prior to release from the site. This outflow will also be equipped with an isolation valve to provide further containment in the event of a pollution incident at the site.

The installation will include a 60,000 litre capacity above ground storage tank for fuel oil to serve the auxiliary burners of the combustion units and standby generator units. It is proposed that the storage tank and delivery connection fittings and pipe work will be contained within a bunded area with a containment capacity of 110% of the tank volume. The road tanker delivery

area will be made up of an impermeable surface which is isolated from the surface water drainage system to prevent contamination.

The application site report concludes that the proposed facility will pose little likelihood of pollution to the land at the site. On the basis of the application site report the Environment Agency agrees with this conclusion. However, pre-operational condition PO07 requires the operator to provide a detailed as-installed site drainage plan and the specific design detail of the site containment infrastructure, including all sub-surface structures and equipment. This condition also requires that a specific inspection and maintenance programme is to be provided for the site containment infrastructure, so that the 'lifetime' sections of the SCR can be implemented from the commencement of operations at the site.

C7 Emissions to air, water or land

Permit condition 3.1

C7.1 BAT Assessment (Thermal Treatment and Abatement Technologies)

The BAT assessment carried out by the Applicant for the proposed waste incineration activity has been reviewed by the Agency with reference to the guidance provided in the SGN and the associated BREF. The Applicant has considered a number of alternative techniques in their BAT assessment which forms part of the Application.

C7.1.1 Selection of Thermal Treatment Technology

The operator considered a number of treatment option combinations and furnace designs in the options appraisal: the moving grate furnace, (specifically the inclined counter-rotating grate), the rotary kiln and the fluidised bed furnace. The appraisal also assessed the viability of pyrolysis and gasification technologies. These are the only relevant and potentially available techniques for incineration of the waste types under consideration in this application.

The operator discounted the rotary kiln furnace from further consideration in the options appraisal as incineration capacity generally limited to a range of 4 to 8 tonnes/hour (the proposed facility needs to be capable of burning up to 22 tonnes/hour in each line). Rotary kiln furnaces are also considered to produce increased fine particulates due to tumbling action of waste in kiln and poor unburnt residue performance in bottom ash.

The Environment Agency accepts the applicants reasoning and the conclusion that a rotary kiln furnace would not be a suitable technique for the large-scale municipal waste incineration proposed for this site.

Pyrolysis and gasification incinerators were discounted from the detailed quantitative options appraisal on the basis that the existing technologies were developed for homogenous feedstocks and there are no comparable scale plants using these technologies in the UK for treating municipal waste. Therefore there is an issue regarding the availability of these technologies for

providing a reliable waste disposal option at the required scale. The BREF states that '*the degree of demonstration (as measured by overall throughput and operational hours) of pyrolysis and gasification on the main European waste streams is low compared with incineration and operational difficulties are reported at some installations*'.

Gasification and pyrolysis plants are likely to result in lower emissions to air than incinerators, however such facilities are likely to entail significant additional energy consumption in waste pre-treatment as they require a more homogenous waste stream than municipal waste incinerators. Both the SGN and the BREF refer to operational problems with additional waste pre-treatment stages (e.g. shredder jamming) leading to additional downtime. Operational experience also suggests that gasification facilities typically require short servicing intervals and therefore experience increased process down-time than the moving-grate incinerators.

The Environment Agency accepts that, at the time of permit application, pyrolysis and gasification technologies had not been established on a commercial basis in the UK at the scale required for this proposal, i.e. the thermal treatment of 44 tonnes of municipal solid waste per hour (operating capacity of 350,000 tonnes per year, assuming 7950 hours operation).

The SGN states that moving grate incinerators can handle large volumes of municipal waste and that the counter-rotating design provides good waste agitation and prevents waste from tumbling forward. The moving grate incinerator is the most common and established type of large-scale municipal waste incinerator in the UK.

Fluidised Bed incinerators have the following advantages:

- combustion efficiency is relatively high, and temperatures are uniform;
- lower temperature leads to lower NOx formation;
- simple furnace, no moving parts; and
- The sand provides continuous attrition of the burning material removing the layer of char as it forms and exposing fresh material for combustion. This assists with both the rate of combustion and burn-out.

However they are described in the SGN as being only suitable for reasonably homogenous waste materials (e.g. sewage sludge), and municipal, commercial and industrial wastes such as those to be received at the Cardiff EfW facility would require extensive pre-treatment prior to incineration, which would lead to a significant increase in the amount of energy used at the site resulting in a lower net export of electricity to the Grid.

This Application is for the Incineration of mixed municipal, commercial and industrial waste. Therefore, we agree that the Applicant's preferred option of a moving grate furnace is BAT for this proposed facility.

C7.1.2 Selection of Abatement Technology

The plant will give rise to emissions to air as a result of the combustion process. Emissions will comprise:

- Nitrogen dioxide and other oxides of nitrogen
- Particulate matter
- Acid gases including oxides of sulphur, oxides of nitrogen, hydrogen chloride, hydrogen fluoride
- Heavy metals
- Volatile organic compounds
- Carbon monoxide
- Dioxins and furans

Ammonia could also be released, as a result of urea introduction as part of the nitrogen dioxide abatement process.

Whether these emissions will be of any environmental significance was a matter on which the Applicant had to provide information, and which the Agency has carefully assessed. This is considered in section C7.2 below.

The BAT options appraisal carried out by the Applicant considered a combination of primary measures and secondary abatement techniques to ensure that emissions to air are minimised using BAT, as well as meeting the requirements of the WID.

This appraisal has been reviewed by the Agency with reference to the SGN and the associated BREF, and is summarised below.

C7.1.2.1 Oxides of Nitrogen Control Measures

For NO_x control the starting position for a determination of BAT is that the proposal should include primary NO_x control techniques (including advanced combustion control systems and/or flue gas recirculation) combined with secondary techniques such as Selective non-catalytic reduction (SNCR) or Selective Catalytic reduction (SCR).

Advanced combustion control systems and use of low NO_x burners are proposed as the primary techniques for the prevention and control of NO_x within the furnace, this is in accordance with BAT as described in SGN. However, the Applicant has stated that they are not proposing to use Flue Gas Recirculation (FGR) to minimise NOx production. The Applicant justifies this decision by stating that the use of FGR to re-introduce flue gases into the combustion chamber reduces combustion control efficiency and leads to increased maintenance problems and costs. It also increases the electrical parasitic load for the plant. The applicant proposes to control combustion by the controlled differential introduction of under-fire and over-fire air distribution across the full extent of all zones of the grate. The MARTIN infrared camera system will also be used to monitor the thermal profile of the burning waste across the extent of the grate and provide additional control of air supply velocity and distribution.

Additional secondary abatement in the form of SNCR or SCR would be required to reduce NOx emissions to below WID limits, irrespective of the primary control measures utilised.

The Applicant's comparison of SNCR and SCR has been reviewed by the Agency with reference to the SGN. Either technique can be BAT depending on the specific circumstances in a given case. The Applicant proposes to use SNCR.

The BREF indicates that SCR is capable of achieving a reduction in NO_x emissions in excess of 80% compared with a reduction of 30% to 60% by SNCR, however SCR requires a higher energy input and periodic regeneration and replacement of catalyst; it also has higher capital and running costs. Notwithstanding the higher energy requirements, SCR also has a lower overall global warming impact, because of higher emissions of N_2O (a highly potent greenhouse gas) from SNCR systems. However, SNCR has the advantage of the avoidance of producing hazardous waste through the generation of waste catalyst and ongoing requirement for routine replacement. SNCR is also significantly cheaper; the Applicant's options appraisal shows annualised operational costs for SCR of £1,986,000 in comparison with SNCR of £904,000. Although SCR has the capability of removing more NOx from the flue stream, the cost per tonne of NOx removed is still significantly higher than that for SNCR, on an equivalent total annual cost basis.

The applicant has also evaluated the Global Warming Potential (GWP) for each technology. SNCR is known to produce small amounts of nitrous oxide (N_2O) as part of the abatement reduction process when using urea as the reagent; which is a potent greenhouse gas with a GWP equivalence of 310 times that of CO_2. However, SCR requires significant additional plant energy input to reheat the flue gas to an effective temperature after it has passed through the bag filter abatement system. Assuming a conservative release rate of N_2O from the SNCR process, the GWP of the SCR process (measured in annual tonnes of CO_2 equivalence) is still 2800 tonnes/annum more than that for the SNCR process utilising urea.

The contribution from the installation to the annual mean concentration for NO_2 is predicted to be a maximum of 1.46 µg/m^3 or 3.7% of the relevant air quality objective using the SNCR abatement technology, based on the conservative assumption that emissions are continuously at the WID limit. SCR technology could potentially reduce this contribution to 0.97 µg/m^3. However having consideration to the existing background concentration of NO_2; this would only reduce the maximum Predicted Environmental Concentration (PEC) from 72.4% to 71.1% of the relevant air quality objective.

The benefits to local air quality from using SCR in comparison with SNCR are therefore small. Photochemical Ozone Creation Potential (POCP) has also been considered by the Applicant in the selection of the NOx abatement system. Although SCR shows a reduced POCP release impact relative to SNCR (it is proportional to the rate of NOx release), the cost per tonne of POCP reduction is significantly higher for SCR due to the significantly higher annualised abatement cost of this technology. The Applicant's conclusion is that the additional cost of SCR in comparison with SNCR is not justified given the relatively small improvements in air quality and POCP potential that will be

delivered and the adverse impact that would arise through the creation of additional hazardous waste.

The Agency agrees with this assessment and accepts that SNCR is BAT for NOx reduction at this Installation.

Selection of NOx abatement reagent

As mentioned above, emissions of N_2O from the SCR and SNCR NOx abatement processes were considered in the BAT assessment through the calculation of the GWP of each option. The BAT assessment detailed above considered an SNCR system that used dry urea as the reagent (SCR systems use ammonia and a catalyst to reduce NOx emissions). An ammonia reagent could also be used in the SNCR system as an alternative to urea. The SGN states that the use of either reagent may represent BAT. The SGN also states that the use of ammonia as the reagent may give rise to lower emissions of N_2O than urea, however urea may be effective over a wider temperature range. The difference in performance between the two reagents is limited.

The Agency agrees that the selection of dry urea as the reagent is BAT on the grounds that it will be easier and safer to handle (in terms of the potential risk posed to human health and the environment from an accidental release) than ammonia.

Emissions of N_2O from the NOx abatement system will be minimised through the optimisation of reagent injection. The operator will be required to demonstrate that the abatement systems have been optimised during the plant commissioning process (as required by Improvement Condition IC3).

C7.1.2.2 Particulate Control Measures

The SGN states that '*fabric filters are proven and when operated and maintained correctly provide reliable abatement of particulate matter to below 5mg/m^3 and are likely to be BAT for many applications*'. The SGN also states that the bag filters should have multiple compartments, which can be isolated, and should be provided with bag burst detection systems, which may include pressure drop monitoring. The SGN also identifies that ceramic filters, electrostatic precipitators and wet scrubbers are alternatives to fabric filters. However, ceramic filters are limited to use in smaller plants and are prone to mechanical failures and electrostatic precipitators and wet scrubbers are not considered to be BAT on their own.

The application states that the proposed facility will be provided with bag filter units which will comprise of multiple compartments. Pressure drop across the filter bags will be continuously monitored, recorded and controlled. When the pressure drop measurement reaches a set point a bag cleaning sequence will initiate, which will be performed online by sending a pulse of compressed air down the inside of each bag filter.

The application states that the expected removal efficiency of the bag filters is 95-99%. The use of a lime reagent in the flue gas abatement process will also result in small particles (less than 1 micron) being agglomerated into the filter cake. Bag filters will be pre-coated with hydrated lime.

The bag filter units will be subjected to an ongoing programme of inspection, maintenance and replacement. Bag filter failure will be quickly detected by a low differential pressure across the bag filter, which will be monitored continuously .Any increase in the emissions of particulates will be rapidly detected by the installation's continuous emissions monitoring system. It will be possible to isolate individual bag filter compartments to identify and replace failed bag(s).

The application indicated that the facility's bag filters could be provided with a bypass which could be operated during start-up and in emergency situations. However, the operator subsequently confirmed the design principle of the bag filter system in a Request for Information response letter dated 17 June 2010. This confirmed that a bag filter bypass is not included in the operational design of the abatement system that will be provided at the facility. This has been incorporated as a condition of operation through table S1.2 of the permit.

The H1 assessment carried out for the emissions of particulates concluded that the emissions were environmentally insignificant (i.e. the predicted emissions from the facility were assessed as being below 1% of the relevant Environmental Assessment Level). The Environment Agency is satisfied that the proposed design and operation of the facility is BAT for the abatement of particulate emissions.

C7.1.2.3 Acid Gas Control Measures

The applicant has undertaken an acid gas abatement options appraisal that considered the following options:

- primary acid gas abatement only
- dry scrubbing using hydrated lime
- dry scrubbing using sodium bicarbonate; and
- semi dry scrubbing system using lime slurry

The Applicant also considered the use of a wet scrubbing system using sodium hydroxide solution. Although wet scrubbing systems can produce good levels of abatement, they also consume large quantities of water, produce significant quantities of liquid effluent for treatment and disposal, and have high capital installation and operational costs. The Operator has therefore not considered the wet scrubbing abatement technique further.

The Applicant considered options for control of acid gases on the basis of, emissions to air, raw material usage and photochemical ozone creation potential (POCP).

Global warming potential (GWP) was also considered, but was not taken further on the basis that energy consumption (and consequent GWP) would be similar for each of the technology options under review.

Dry and semi dry systems both produce larger quantities of solid waste but do not produce liquid effluent. Removal efficiencies are also lower. The Applicant's BAT assessment shows that: -

- Both options offer a similar POCP performance, raw material usage for given level of abatement and production of APC residue
- The global warming potential of the dry system is assessed as being lower that of a semi-dry system.
- The dry system uses less water and has a marginally lower annualised cost for the same level of acid gas abatement.

The Applicant has also assessed whether the dry system should be based on lime or sodium hydrogen carbonate (sodium bi-carbonate). Although the Applicant acknowledges that the APC residue resulting from use of sodium hydrogen carbonate will be lower than that resulting from the use of lime, they have indicated that lime should still be considered the BAT reagent for this site. The reasons stated for this are:

- The residue resulting from use of sodium hydrogen carbonate has a higher leachability than lime-based residues, which will limit the disposal options.
- the sodium hydrogen carbonate system has a slightly higher global warming potential due to the reaction chemistry, releasing about 3000Te of additional CO_2 annually.

The comparison of Dry and Semi-Dry acid gas abatement techniques has been reviewed by the Agency, and we agree with the Applicant's assessment that for the purpose of acid gas abatement, a dry scrubbing system using hydrated lime reagent is BAT.

The Applicant has also indicated that acid gas emissions from the installation will be minimised by the following primary techniques:

- sulphur dioxide emissions will be controlled through the selection of low sulphur gas oil (<0.1% sulphur, specified in Table S3.1 of the Permit) as the auxiliary burner fuel.
- variability in acid gases will be minimised by up front waste management which will include pre-acceptance procedures and good mixing prior to feed to the furnace.
- The dry lime injection system will incorporate recirculation of the reagent into the reactor vessel to maximise efficient use of the reagents.
- Unlike NOx emissions, emissions of HCl, HF and SO_2 are likely to be variable and dependant on the nature of the waste being combusted. Therefore the dosing rate of lime will be controlled by monitoring the HCl concentration of the upstream gas. The efficiency of the lime dosing system will be measured by continuous HCl and SO_2 monitoring of the gas stream increase in acid gas concentration beyond a defined level in the exhaust gas will trigger an alarm. HCl continuous monitoring will be used as a surrogate for continuous monitoring of HF.

Improvement Condition IC3 has been set, which requires that control of acid gas abatement is optimised as part of the commissioning process.

C7.1.2.4 Abatement of heavy metals and dioxins

The SGN states that the primary way of minimising emissions of dioxins is by combustion control, as detailed in Sections C1.3 and C1.4 above. In addition to this, dioxins and furans will also be removed from flue gases by particulate abatement, aided by the injection of activated carbon. Similarly, the SGN identifies particulate abatement as the main means for minimising the release of the majority of metals. The application states that bag filters and carbon injection will be employed at the site in order to control and minimise the release of heavy metals and dioxins and furans from the incineration process.

The majority of the heavy metals in the exhaust gas from the boiler will be in particulate form as they will not be volatile at the temperature of the gas as it enters the abatement system of the proposed plant. Therefore these metals will be removed from the gases by the particulate abatement system (bag filters), as described previously, and collected as APC residue.

However, there will be a small number of volatile metals in the exhaust gas, such as Mercury, and very low concentrations of dioxins. These volatile metals/metal compounds and dioxins/ dioxin-like polychlorinated biphenyls/ polycyclic aromatic hydrocarbons /furans will be abated through the injection of activated carbon into the gas stream.

The activated carbon particles bind with the mercury and other compounds in the exhaust gas in the duct and in the particulate abatement system. Subsequently, the activated carbon containing the mercury (and other compounds) is captured in the bag filter abatement system.

It has been found that greater removal of metals, such as mercury, and other compounds, such as dioxins, is obtained with a fabric filter compared to other particulate abatement techniques (e.g. electrostatic precipitation) because of increased gas-particle contact in the filter cakes that form on the surface of the bags in a fabric filter.

The Environment Agency is satisfied that the proposed design and operation of the facility is BAT for the abatement of heavy metal and dioxin emissions.

C7.1.2.5 Auxiliary Fuels

Emissions of acid gases from the facility will also be determined through the selection of auxiliary fuels, which would be used during plant start-up and shut-down or to help maintain the furnace temperature above the minimum temperature required by WID (850°C). The auxiliary burners are expected to operate for less than 150 hours per year. The proposed facility will use oil-fired auxiliary burners, which will be fired on oil that has a maximum sulphur content of 0.1%w/w, in accordance with the Sulphur Content of Liquid Fuels Regulations. Taking into account the increased safety risk associated with the dual use of gas and oil compared to just oil, the low sulphur content of the proposed fuel and the limited operating time of the plant on auxiliary fuels, the Environment Agency is satisfied that the selected auxiliary fuel is BAT. Condition 4.2.1 of the permit will require the operator to report the annual use of gas oil to the Environment Agency.

C7.1.2.6 Global Warming Potential (GWP) and Carbon Dioxide Emissions

This section summarises the assessment of greenhouse gas impacts which has been made in the determination of this permit.

The global warming potential of a municipal waste incinerator is determined principally by the emissions of carbon dioxide that are released as a result of waste combustion.

The quantity of CO_2 released from the combustion of waste at the facility will be determined primarily by the quantity and characteristics of the waste incinerated, which would be constant for all of the assessed options considered. Similarly the quantity of CO_2 released from the burning of the auxiliary fuel (oil) will be largely unchanged across all options, as they all use the same auxiliary fuel, and has therefore been assumed to be constant.

The export of electricity from the installation generated from the burning of waste will result in overall reductions in emissions of carbon dioxide, as virgin fossil fuels will not be used additionally elsewhere to create the electricity supplied to the National Grid by the proposed waste facility. The more energy efficient the facility, the more the facility will contribute to savings of virgin fossil fuels used to generate that same energy elsewhere. The operator has included an assessment of the relative energy efficiency (electricity only production without CHP) of various thermal treatment options in their global warming potential appraisal. This concluded that the direct incineration of waste and production of steam to drive a turbine for electricity production offered the best predicted range of energy generation efficiency. In the case of the Cardiff EfW facility, realisation of any of the CHP options identified in the Heat Plan provided as part of the application would further increase the overall energy efficiency of the plant.

There will also be some emissions of nitrous oxide (N_2O) from the NOx abatement processes. Whilst these will be much smaller than the emissions of CO_2 from the facility in terms of quantity, these could still be significant as N_2O is known to be approximately 310 times more potent as a greenhouse gas than carbon dioxide. The BAT appraisal compared SCR and SNCR methods of secondary NOx abatement. The SGN indicates that N_2O emissions have the potential to be higher for SNCR than SCR, however SCR is associated with higher energy requirements, and therefore increased emissions of CO_2, relative to SNCR systems. These factors were reflected in the options appraisal carried out by the applicant and were reviewed previously in section C7.1.2.1 above.

Conclusion

The Agency is satisfied that the operator has made an appropriate assessment of global warming and that its proposals represent BAT. Carbon dioxide differs from other pollutants at the installation, however, in that its effect on the environment is at a global, rather than a local, level. The Environment Agency recognises that CO_2 is an inevitable product resulting from the combustion of waste and that it is not appropriate to set an 'emission limit value' for CO_2. The actual amount of CO_2 emitted from the plant itself will

be determined by the quantity and characteristics of waste that is incinerated, which are already subject to conditions in the permit.

As the installation is not subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2003, consideration has been given to the setting of equivalent parameters or technical measures for CO_2. As the primary purpose of the plant is the disposal of waste by combustion and the recovery of energy (through the generation of electricity and recovery of waste heat where possible); the overall quantity of CO_2 emitted as a result of the operation of the installation (both directly and indirectly) will be determined by the capacity of the plant and the efficiency of the energy recovery process. Thus provided energy is recovered efficiently (see section B3), there are no additional equivalent technical measures (beyond those relating to the quantity and characteristics of the waste) that can be imposed that do not run counter to the primary purpose of the plant, which is the destruction of waste.

C7.1.2.7 BAT and Persistent Organic Pollutants (POPs)

International action on Persistent Organic Pollutants (POPs) is required under the Stockholm Convention, which entered into force in 2004 and is signed by 151 nations. In response the EC implemented the Stockholm Convention through the POPs Regulation (850/2004), which is directly applicable in UK law. The Agency is required by national POPs Regulations (SI 2007 No 3106) Regulation 4(b) to give effect to Article 6(3) of the EC POPs Regulation when determining applications for environmental Permits.

Article 6(3) of the EC Regulation; provides as follows:

"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."

Article 6(3) of the EC Regulation applies to both intentionally-produced POPs (which are not relevant to waste incineration) and to unintentionally produced POPs, such as those produced by the incineration of waste. Indeed high-temperature incineration is one of the prescribed methods for destroying POPs.

The UK's national implementation plan for the Stockholm Convention, published in 2007, makes explicit that the relevant controls for unintentionally-produced POPs are delivered through 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 decision document (and the draft issued for public consultation), which explicitly addresses alternative techniques and BAT for the minimisation of emissions of dioxins.

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.

The Government is of the opinion 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. EP Regulations require 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. Section A1.2.6 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 a further POP identified within the Stockholm Protocol as arising unintentionally from combustion processes. The European Environment Agency (EEA) 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].

We have assessed the control techniques used for dioxins within this determination and have concluded that they are appropriate for dioxin control. We are confident that these controls will also minimise the release of HCB.

The text of article 6(3) of the EC Regulation is lifted from Part B of Annex C, Part V of the Stockholm Convention, which relates to "Best Available Techniques". It lists the factors to be considered in determining BAT for particular installations, including the use of improved methods of flue-gas cleaning, treatment of residual wastes, processes that lead to the reduction or elimination of emissions, and processes to improve combustion and prevent

formation of POPs. Consideration of these matters is set out in detail in this Decision Document.

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

C7.2 Emissions to Air

C7.2.1 Overview

We have reviewed the techniques proposed by the operator and compared these with the relevant guidance notes, including in particular the European Commission Reference Document on the Best Available Techniques for Waste Incineration (BREF) and the Agency's Incineration of Waste Sector Guidance Note S5.01 (SGN) and Horizontal Guidance Note EPR H1 Environmental Appraisal and Assessment of BAT (H1).

We have also reviewed the operator's assessment of the environmental impact of emissions from the installation. The EP Regulations require that emissions from the installation are prevented or minimised, particularly through the use of BAT. In addition, the WID sets out air emission limit values for a range of substances (including particulates, hydrogen chloride, hydrogen fluoride, sulphur dioxide, nitrogen dioxide, dioxins and metals), based upon daily and half-hourly average values or spot values as appropriate. It is a requirement of Article 7 of the WID that incineration plants are "designed, equipped, built and operated" so that these emission limit values are not exceeded.

The impact assessment has adopted the criteria set out in Horizontal Guidance Note H1, which state that emissions are unlikely to lead to significant environmental impacts where:

1) the contribution to long term ground level concentrations is less than 1% of the relevant air quality standard; and
2) the contribution to short term ground level concentrations is less than 10% of the relevant air quality standard.

What this means is that, where an emission can be screened out as insignificant, based on the conservative approach adopted by H1, the Agency considers that whatever technique achieves the associated emission level is BAT, as it would not be reasonable or proportionate to require an operator to take further or additional steps, or incur additional expenditure, where no material environmental benefit results.

On the other hand, an exceedence of these thresholds, which are set in order to be able to undertake this preliminary screening exercise, does not necessarily mean an emission will have a significant impact but that a more detailed assessment is required to be able to determine the actual environmental impact, for example, by taking into account existing

background (ambient) concentrations of the emission in question and using dispersion modelling. It may be that, once that additional assessment has been undertaken, that it can be seen that the emission is at a level which will cause no significant environmental or human health impact.

The applicant assessed the installation's potential emissions to air against the relevant air quality standards and potential impact upon local habitat sites and human health. These assessments predicted the potential effects on local air quality from the installation's stack emissions using the AERMOD GIS PRIME dispersion model (a dispersion model sensitivity analysis was also undertaken using ADMS. The models used 5 years of Meteorological data collected from Cardiff International Airport (2003-2007). The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling using terrain data, which was applied to the entire modelling area. The concentrations reported in the assessments were the maximum ground level concentrations predicted by the dispersion modelling packages over the 5 years of met data.

The air impact assessments, and the dispersion modelling upon which they were made, were based upon conservative assumptions. They assumed operation of the plant continuously at the short-term and long-term WID emission limit values, i.e. the maximum permitted emission rates under the WID. The limits set out by the WID are such to provide a high level of environmental protection.

Operational controls compliment the emission limits and should generally result in emissions below the maximum allowed whilst the limits themselves provide headroom to allow for unavoidable fluctuations. Actual emissions are also almost certain to be below WID 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. The assessment is therefore a worst-case scenario.

The way in which the dispersion model was used, and the input data and assumptions made by the applicant, have been reviewed by the Agency's specialist Air Quality Modelling and Assessment Unit (AQMAU).

The results and conclusion of the impact assessments introduced above are discussed in detail in Section C7.3 of this document. In summary, following the completion of check-modelling, AQMAU agreed with the assessment's conclusion that the predicted concentrations of all WID pollutants considered were well within the relevant air quality objectives and environmental assessment levels. AQMAU also audited the air quality and human health impact assessment and agreed that the conclusions drawn in the reports were acceptable.

The application ecology assessment was reviewed, and a detailed Appendix 11 was compiled using the data provided. This was subsequently submitted to the Countryside Council for Wales (CCW) who agreed with the Agency

conclusion that the impact of the facility's emissions upon the nearby Severn Estuary SAC/ SPA/Ramsar site would not have any likely significant effect.

C7.3 Impact Assessments

C7.3.1 Air Quality

The applicant has carried out air dispersion modelling to predict the impact of the emissions from the incinerator on local air quality. The modelling was undertaken using the AERMOD GIS PRIME package and with five years of sequential meteorological data (2003-2007) for the met station at Cardiff International Airport at Rhoose which is approximately 15km to the south-west of the site. The results reported in the assessment are the maximum ground level concentrations predicted by the dispersion modelling packages in any of the five years of met data. The modelling is based on emissions from the incinerator at the emission limit values given in the Waste Incineration Directive and assumes the plant is operating at full load. Two scenarios have been modelled: (i) emissions at the WID daily average emission limits values (ELVs) and spot limits for metals and (ii) emissions at the half-hour WID limits (half hour averaging period). The predicted ground level concentrations from the proposed facility (process contributions (PC)), operating at the WID emission limits, were assessed against the relevant long-term and short-term environmental quality standards (EQS) for the pollutants of interest. We are satisfied that there are no emissions that are considered significant other than those covered by WID and/or emission limits in the permit.

The methodology adopted by the applicant for the air quality impact assessment has been reviewed by the Agency's specialist Air Quality Modelling and Assessment Unit (AQMAU). The models and met data used and the assumptions made in defining the source term and characterising the modelled domain were all found to be satisfactory and appropriate. Therefore, the Agency considers the results of the assessment presented in the application to be a reasonable basis on which to draw conclusions about the magnitude of the impact of the proposed facility.

The impact assessment adopts the criteria set out in Technical Guidance Note H1 i.e. that emissions are unlikely to lead to significant environmental impacts where:-
(i) the contribution to long term (annual average) ground level concentrations is less than 1% of the relevant air quality standard; and
(ii) the contribution to short term (usually one hour average) ground level concentrations is less than 10% of the relevant air quality standard.

However, as explained above, exceedence of these thresholds does not necessarily mean a release will have a significant impact. It means that a more detailed assessment is required, i.e. taking into account background/ambient concentrations and using dispersion modelling, before reaching final conclusion.

As mentioned above, two scenarios of operation were assessed, operation of the plant at the daily average WID emission limits and spot values and at the half-hourly WID emission limits. These emissions were assessed against the relevant long term and short term EQS, where available (i.e. Environmental Assessment Levels and Air Quality Objectives). The results of the air quality assessment, in terms of potential long-term and short-term impacts, are discussed below.

Assessment of long-term impacts assuming operation at WID daily average ELVs and spot limits

The operator assessed the potential long term impact of the emissions which would result from the operation of the proposed facility at the daily average WID emission limits for those substances subject to continuous measurement and the WID spot limits for substances such as metals which are measured by extractive sampling. Long term impacts were assessed for the following pollutants: particulate matter (PM), hydrogen chloride (HCl), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), volatile organic compounds (VOC), cadmium (Cd), thallium (Tl), mercury (Hg), antimony (Sb), arsenic (As), chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), manganese (Mn), nickel (Ni) and vanadium (V). These predicted emissions were assessed against the relevant long-term (annual) air quality standards. Concerning the standards for arsenic, cadmium and nickel, the assessment adopted the more stringent guideline values for these pollutants proposed in the Fourth Air Quality Directive for adoption from 2012.

The assessment found that all calculated Predicted Environmental Concentrations (PEC = predicted process contribution + existing background concentration of pollutant) were below the long-term Environmental Quality Standards and all process contributions were below 1% of the relevant EQS with the exception of the pollutants detailed in the table below:

Pollutant	EQS ug/m^3	BC ug/m^3	PC ug/m^3	PC as % EQS	PEC ug/m^3	PEC as % EQS
NO_2 (Annual)	40	27.9	1.093	2.73	28.99	72.5
Cd (Annual)	0.005	0.00038	0.000128	2.56	0.000508	10.2
As (Annual)	0.006	0.00111	0.000284	4.73	0.001394	23.2
Ni (Annual)	0.02	0.00246	0.000284	1.42	0.00274	13.7
VOC (Annual)	5	0.57	0.051	1.02	0.621	12.4

EQS - Environmental Quality Standard
BC - Background Concentration

The highest process contribution predicted by the modelling is the annual average emission for arsenic, which was 4.73% of the EQS. However, the predicted environmental concentration (PEC) of Arsenic, taking into account background concentrations, is only 23.2% of the annual EQS. Similarly, process contributions of cadmium and nickel were also found to be above 1%

of the EQS (2.56% and 1.42% respectively), however the PEC for these pollutants were only 10.2% and 13.7% of the EQS, respectively.

The highest long-term predicted environmental concentration, when expressed as a percentage of the EQS, is for annual average concentrations of NO_2, which were predicted to be 72.5% of the EQS. However, the predicted environmental concentration is dominated by the existing background concentration: 27.9 ug/m^3 of the predicted 28.99 ug/m^3 annual average level of NO_2 already exists in the ambient air from existing sources, principally traffic. The predicted annual process contribution of NO_2 alone represented only 2.73% of the EQS and approximately 3.9% of the existing background concentration. Background concentrations were also found to be dominant for VOCs. The predicted annual process contribution of VOC represented only 1% of the EQS and approximately 8.9% of the existing background concentration.

Taking into consideration the conservative nature of the assessment (i.e. assuming continuous operation of the plant throughout the year at the WID limits coinciding with the worst-case meteorological conditions and using the maximum ground level concentrations in the assessment) the Agency concludes that even if the emissions to air are continuously at the long-term limits they will not have a significant effect upon the environment and air quality.

Further consideration of Group 3 Metals

The above assessment assumes each of the 9 Group 3 metals is present at 1/9th of the WID limit in the emission exhaust stream. A more pessimistic scenario would be for each of the 9 metals to be present at the aggregate WID limit for all of the metals in this Group. The results of this pessimistic scenario are set out in the table below.

Pollutant	EQS ug/m^3	BC ug/m^3	PC ug/m^3	PC as % EQS	PEC ug/m^3	PEC as % EQS
Sb (Annual)	5	n/a	0.0024	0.05	n/a	n/a
Cr (Annual)	0.1	0.005	0.0024	2.4	0.0074	7.4
As (Annual)	0.006	0.00111	0.0024	40	0.00351	58.5
Ni (Annual)	0.02	0.00246	0.0024	12	0.00486	24.3
Co (Annual)	0.2	n/a	0.0024	1.2	n/a	n/a
Cu (Annual)	2	0.0315	0.0024	0.1	0.039	1.6
Mn (Annual)	1	0.012	0.0024	0.24	0.0144	1.4
Pb (Annual)	0.5	0.0178	0.0024	0.48	0.0202	4.0
V (Annual)	5	0.00276	0.0024	0.05	0.00516	0.1

All process contributions were below 1% of the relevant EQS with the exception of Chromium, Arsenic, Nickel and Cobalt. The PC's for Chromium and Cobalt were only 2.4% and 1.2% respectively and this will only contribute a minor impact. The PC's for Arsenic and Nickel are relatively high at 40%

and 12% respectively, although in both cases the PEC is significantly less than 70% of the annual assessment criterion. Also, data from operational Municipal Waste Incinerator plants in England show it is highly unlikely that there will be a 100% contribution for a particular metal. Indeed the data indicates that levels were well under the 1/9th value of the WID limit (11%), which would significantly reduce the predicted impact values relative to the pessimistic levels presented in the table above.

Further Consideration of Arsenic, Nickel and Chromium (VI)

The 2009 report of the Expert Panel on Air Quality Standards (EPAQS) – Guidelines for Metal and Metalloids in Ambient Air for the Protection of Human Health, proposes 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.

Arsenic, Nickel and Chromium are three of the nine Group 3 metals whose emissions are subject to a mandatory maximum emission limit by the WID. WID sets an aggregate limit of 0.5 mg/m^3 for all nine Group 3 metals.

The EPAQS guidelines refer only to that portion of the metal emissions contained within PM_{10} in ambient air. The new guidelines are 3 ng/m^3 for Arsenic, 20 ng/m^3 for Nickel and 0.2 ng/m^3 for Chromium (VI). These are significantly lower than previous EALs for Arsenic and Chromium (VI), though the level is unchanged for Nickel (as per the 4th Air Quality Directive.) and so no further consideration is required for that metal.

The WID limit for Group 3 metals of 0.5 mg/m^3 covers gaseous and vapour forms of the metals and their compounds as well as that present in particulate matter. WID has a separate emission limit values for emissions to air of total particulate material. The EPAQS guideline also refers to Chromium (VI) only, whereas the Group 3 WID limit includes all valency states of Chromium.

Measurement of Chromium (VI) at the levels anticipated at the stack emission points is expected to be difficult, with the likely levels being below the level of detection by the most advanced methods. We have considered the concentration of total chromium and chromium (VI) in the APC residues (bag dust) collected upstream of the emission point for existing Municipal Waste incinerators and have assumed these to be similar to the particulate matter released from the emission point. These data show:

1. The mean proportion of Cr (VI) to total Cr is less than 1%. There are two outliers at 2%.

2. The mean total Cr emission from these plants is 0.006 mg/m^3 (max 0.03 mg/m^3).

3. The mean Cr (VI) emission concentration (based on the above bag dust ratio) is 2.1 x 10^{-5} mg/m^3 (max 1.0 x 10^{-4} mg/m^3).

Giving similar consideration to the arsenic content present in the APC residues, we consider the mean emission from these plants to be 0.002 mg/m^3 (max 0.015 mg/m^3).

The EPAQS report also sets out information on background levels of Arsenic and Chromium. Typical background levels proposed in the EPAQS report are as follows: -

Arsenic 0.0001 to 0.0004 µg/m^3
Chromium (VI) 0.00004 to 0.00014 µg/m^3

Air Dispersion Modelling in the application makes the conservative assumption that emissions of particulate matter occur continuously at the WID limit, and that each Group 3 metal is emitted continuously at one ninth of the aggregate WID limit for this metal Group, and that Cr (VI) would constitute 10% of the total Cr (VI) emission.

	Applicant's Assessment (Previous EAL values)		Applicant's Assessment (New EPAQS Guideline values)	
	PC	PEC	PC	PEC
Arsenic	0.14%	0.7%	9.5%	33%
Chromium (VI)	0.03%	4.5%	14.2%	240%

However these are very much worst case assumptions and unlikely to be representative of actual emissions.

Based on the data described above, we consider it remains a conservative assumption to consider that the maximum Cr (VI) emission concentration will be 0.0001 mg/m^3 and that the maximum expected emission for Arsenic will be 0.015 mg/m^3. We have used these data and outputs from the dispersion modelling for the proposed installation provided in the Application, to assess the predicted Cr (VI) and Arsenic impacts.

The table below shows our assessment using the representative maximum emission and background value data referred to above.

Pollutant	EQS ug/m^3	BC ug/m^3	PC ug/m^3	PC as % EQS	PEC ug/m^3	PEC as % EQS
Arsenic	0.003	0.0004	0.000077	2.56	0.000477	15.9
Chromium (VI)	0.0002	0.00014	0.0000005	0.25	0.0001405	70.3

This assessment shows that a breach of the air quality guidelines for Arsenic and Chromium (VI) is unlikely.

The installation has been assessed as meeting BAT for control of emissions of metals to air.

Therefore taking all these factors into account, it is considered appropriate to set an improvement condition requiring confirmation of the assessment made above, based on actual measurements of emissions. This is included in Table S1.3 of the permit as IC5. A period of one year's data has been specified to take account of any natural variation in the waste composition. The Improvement Condition seeks to verify whether the actual releases are as expected within these limits, in which case no further action is required.

In the event that the assessment were to indicate a risk of the air quality guidelines being exceeded, the Agency could specify a specific emission limit value for Arsenic or Chromium as appropriate or seek beyond BAT improvements to the abatement technology employed.

Thus, further assessment of actual Arsenic and Chromium emissions from the installation is expected to demonstrate that the proposed EPAQS air quality guidelines can be achieved for Chromium (VI) and Arsenic.

Assessment of short-term impacts assuming operation at daily average and spot WID limits

The operator assessed the potential short-term impact of the emissions which would result from the operation of the proposed facility at the daily average WID emission limits for those substances subject to continuous measurement and the WID spot limits for substances such as metals which are measured by extractive sampling. Short-term emissions were assessed for the same pollutants that were considered in the long-term assessment and hydrogen fluoride. All emissions were assessed as being below 10% of the relevant short-term EQS and could therefore be screened out for insignificance in accordance with the H1 assessment methodology. The highest short-term process contribution predicted by the modelling was the 1-hour average emission of NO_2, which was 3.4% of the EQS. Taking into account existing background pollutant concentrations the PEC for the 1-hour average for NO_2 was 31% of the EQS and therefore well within the air quality standard.

The Effect on Air Quality Management Areas (AQMA's) declared by Cardiff City Council and the Welsh Assembly Government (WAG)

Four AQMA's have previously been declared in Cardiff for NO_2. These are the Newport Road AQMA, the Philog AQMA, the Cardiff West AQMA and the St Mary Street/High Street AQMA. However, in the most recent review and assessment (October 2006) it was concluded that the Newport Road and Philog AQMA's are no longer necessary and the Cardiff West AQMA could be replaced by a smaller area AQMA to the west of the city.

The St Mary Street/High Street AQMA is approximately 2km to the north-west of the site, and we are satisfied from the information and isopleth maps

provided in the application that the process contribution of nitrogen dioxide from the installation will not cause any significant short or long term impact contribution at this AQMA and there is no risk of the EQS being exceeded as a result of the proposed activities .

The Welsh Assembly Government (WAG) has recently consulted on a short term air quality action plan for the South Wales zone. However, only one area of concern has been identified to date, and this relates to particulate levels in the Neath/Port Talbot area and is therefore not relevant for consideration in relation to this site.

The Agency concludes that the emissions from the installation will not have any significant effects upon NO_2 levels in the AQMA's.

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

The impact on air quality from particulate emissions has been assessed against UK Air Quality Standards for PM_{10}; the Clean Air for Europe (CAFE) objectives and World Health Organisation (WHO) guidance for $PM_{2.5}$.

For PM_{10}, the UK Air Quality Standards are a long term annual average of 40 $\mu g/m^3$ and 50 $\mu g/m^3$ as a short term daily average. For $PM_{2.5}$, CAFE proposes a new urban background level of 25 $\mu g/m^3$ to be achieved by 2020; whereas the WHO guidance value is 10 $\mu g/m^3$. Both the CAFE and the WHO values are based on long term average concentrations.

The impact of the installation against these standards and guidelines is shown in the table below – all concentrations are shown as $\mu g/m^3$. The assessment assumes that all particulate emissions are PM_{10} or $PM_{2.5}$ and that both PM_{10} and $PM_{2.5}$ will be emitted at the WID emission limit values

Pollutant	EQS	BC	PC	PC as % EQS	PEC	PEC as % EQS
PM_{10}	40	20.9	0.05	0.13	20.95	52.3
$PM_{2.5}$	25	13.8	0.05	0.2	13.85	55.4
$PM_{2.5}$	10	13.8	0.05	0.5	13.85	139

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

- It assumes that the plant emits particulates continuously at the WID emission limit (10 mg/m^3). Whereas actual emissions from similar plant are typically 20% of this value.
- 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.
- The proportion of $PM_{2.5}$ in the flue gas was unknown and therefore, in order to present a worse-case assessment, the assessment of $PM_{2.5}$ was carried out using the process contribution calculated for PM_{10},

therefore assuming that all particulate emissions from the plant would be $PM_{2.5}$, which is clearly even more unlikely.

The above assessment shows that the predicted process contribution for emissions of PM_{10} is below 1% of the long term air quality standard and below 10% of the short term air quality standard and so can be considered insignificant.

The above assessment also shows that the predicted process contribution for emissions of $PM_{2.5}$ is also below 1% of the CAFE air quality objective and the WHO guideline. Therefore the Agency concludes that particulate emissions from the installation will not give rise to significant pollution.

There is currently no measurement standard specifically for fine particulate matter in the $PM_{2.5}$ fraction. Whilst the Agency is confident that current monitoring techniques will capture the fine particle fraction for inclusion in a measurement of total particulate matter, a permit improvement condition has been included that will require a full analysis of particle size distribution in the flue gas, and hence determine the ratio of fine to coarse particles. In the light of current knowledge and available data however the Agency is satisfied that the health of the public would not be put at risk by such emissions. Improvement Condition IC4 has been imposed requiring the operator to carry out tests to determine the particle size distribution in the exhaust gas emissions.

Particulates smaller than 2.5 microns

The Operator will be required to monitor particulate emissions using the method set out in EN 13284-1. 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. This means that particulate monitoring data effectively captures everything above 0.3 microns and much of what is smaller. It is not expected that even smaller particles 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

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 and in particular on children's health because of their high surface to volume ratio, making them more reactive and their very small size and 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 Health Protection Agency (HPA) address 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 the Committee on the Medical Effects of Air Pollutants (COMEAP) and goes on to say that if these co-efficients 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.

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 exceed $PM_{0.1}$. This is borne out by the assessment of this application which show emissions of PM_{10} to be insignificant

Assessment of emissions of dioxins and furans

Air concentrations of dioxins and furans are recognised as an insignificant route of exposure via the respiratory route for humans to these substances and no standards for dioxins and furans in air have been set. Dioxins and furans have been assessed, together with metals, in terms of overall intake, including both inhalation and the more significant exposure route of ingestion. The assessment of dioxins and furans has been undertaken in the resubmitted human health risk assessment (HHRA) supplied by the Applicant on 12/05/10, and is discussed below in Section C7.3.2 of this document.

C7.3.2 Human health risk assessment

The application submitted by Viridor assessed the potential emissions to air from the proposed facility against the relevant statutory and non-statutory environmental assessment levels for air quality (e.g. UK Air Quality Strategy Standards and Environmental Assessment Levels published by the Environment Agency). These levels have been established specifically in order to protect human health and the environment. The air quality assessment concluded that the potential emissions from the proposed facility will not result in the exceedence of any of the assessed air quality standards or contribute significantly to the environmental concentration of a substance that is at risk of breaching a relevant standard taking into account existing background concentrations. In addition to this assessment (detailed in section C7.3.1) the applicant also included a Health Risk Assessment as part of the application (Appendix 12 of Section 10) in order to assess the impact on human health resulting from the proposed facility. However, on reviewing

this assessment the Agency considered that it did not fully describe or quantify the health risk issues, and the applicant was requested to provide a revised and more comprehensive report to fully consider the human health issues. This report was submitted to the Agency on 12 May 2010.

AQMAU has audited the air quality and health impact assessments, including the additional assessment report, which included carrying out check-modelling, and has accepted the conclusions drawn from them.

Cardiff Local Health Board were consulted with the EP application submitted for the proposed facility and concluded that they had no significant concerns regarding the risk to the health of the local population from the installation. The Food Standards Agency were also consulted during the permit determination process and they concluded that it is unlikely that there will be any unacceptable effects on the human food chain as a result of the operations at the installation.

The results and conclusions of health risk assessment contained in the EP application are summarised below.

Assessment of health effects from compounds of potential concern (dioxins/furans and metals)

The potential health impacts of the predicted emissions of metals from the proposed facility, along with emissions of dioxins and furans, were assessed using the US EPA Human Health Risk Assessment Protocol (HHRAP) and the Industrial Risk Assessment Programme (IRAP) database. Ground level concentrations of the assessed substances were calculated using air dispersion models. The HHRAP identifies compounds of potential concern (COPC) which are included in the IRAP database. Some of the metals covered by the WID limits (i.e. copper, cobalt, manganese and vanadium) are not included in the HHRAP because it is considered that they pose little or no hazard in terms of long-term health impacts. The compounds assessed in the human health impact assessment were: Dioxins & furans, Antimony, Arsenic, Cadmium, Chromium, Mercury, Lead, Nickel and Thallium.

The IRAP model was used to assess the potential human health impacts resulting from exposure of local people to the identified persistent substances through the key pathways of inhalation of air and ingestion of food and soil. The assessment considers the potential impact of the persistent pollutants through long-term cumulative exposure over a human lifetime, taken as 70 years. The model was applied to a worst–case scenario, which represented an individual exposed for a life-time to the effects of the maximum predicted airborne emissions and consuming mostly locally grown food.

The IRAP model applies hazard indexes for different categories of local receptors, classified as “farmers” and “residents”, based upon the level of expected exposure. It is assumed that a farmer proportionally eats more locally grown food than a resident and therefore represents a more sensitive

receptor to the assessed compounds. The model considers all locations within the modelled area as potential receptors, and identifies farmer and resident receptors by selecting the locations in the rural or residential land use areas where airborne concentrations and wet and dry deposition rates are highest.

The IRAP model database defines a large number of physical and chemical parameters for each assessed compound to represent its behaviour in the environment, and toxicity factors to determine the carcinogenic risk or exposure hazard. Parameters are also used in the model to characterise the location and surroundings of the modelled area and the receptors that are within it. The model calculated the additional dose of compounds of potential concern (dioxins, furans and metals) received by local receptors resulting from the operation of the proposed facility. This was calculated for a variety of farmer and resident receptors which were selected based upon the maximum predicted airborne concentration and maximum predicted deposition rates.

The human health risk assessment used the IRAP model to calculate and assess the risk to local human receptors from carcinogenic and non-carcinogenic health effects. Calculated dose of dioxins and furans received by local receptors was also assessed against Tolerable Daily Intake (TDI) levels established by the World Health Organisation (WHO) and the UK Committee on Toxicity (COT) and finally metals were assessed against a total diet study background intake of metals. The results of the assessments are discussed below.

Risk of carcinogenic health effects

Based on specified metal and dioxin/ furan emission rates and air dispersion modelling, the applicant has predicted cumulative cancer risks and hazard quotients, infant dioxin/furan intake through breast milk and ground lead concentration. These are the outputs of the IRAP software (also based on the USEPA HHRAP) that the applicant used. No significant human health risks or hazards were predicted. In the air quality report provided in the Application (402.0036.00306, November 2008) the applicant also carried out predictive modelling of metal concentrations and compared the results with relevant EALs and air quality standards.

The derivation of cancer risks (as carried out in the applicant/s modelling) while currently US practice, is not normal procedure in the EU and UK where tolerable dioxin/ furan daily doses (TDIs) are defined below which the likelihood of an adverse health effect is deemed to be acceptably low.

AQMAU check modelling using procedures based on USEPA HHRAP and HMIP methodologies indicates that there will be no significant human health risks resulting from the proposed plant emissions. These methodologies calculate exposure doses to dioxins and furans (UK HMIP and USEPA) and metals (USEPA only) arising from inhalation and ingestion. The input air concentrations are based on the highest grid predictions. The overall conclusion arising from the AQMAU check modelling is in agreement with that

of the applicant. AQMAU check modelling of metal concentrations found that relevant EALs for metals will not be exceeded.

We are therefore satisfied that through compliance with the emission limits imposed by the permit, we would not expect any adverse impact on human health to result from the activities at the proposed installation. This conclusion is consistent with the outcome of recent studies undertaken by the HPA which are summarised below.

Review of existing guidance and reports on the potential health effects of waste incinerators

Recent independent reviews of evidence on the potential health effects of waste incinerators have generally concluded that modern, well-managed waste incinerators contribute little to the concentrations of pollutants in ambient air and that the additional concentrations have little impact upon human health. The results of the impact assessments that have been completed for the proposed Cardiff EfW incinerator are consistent with this general conclusion.

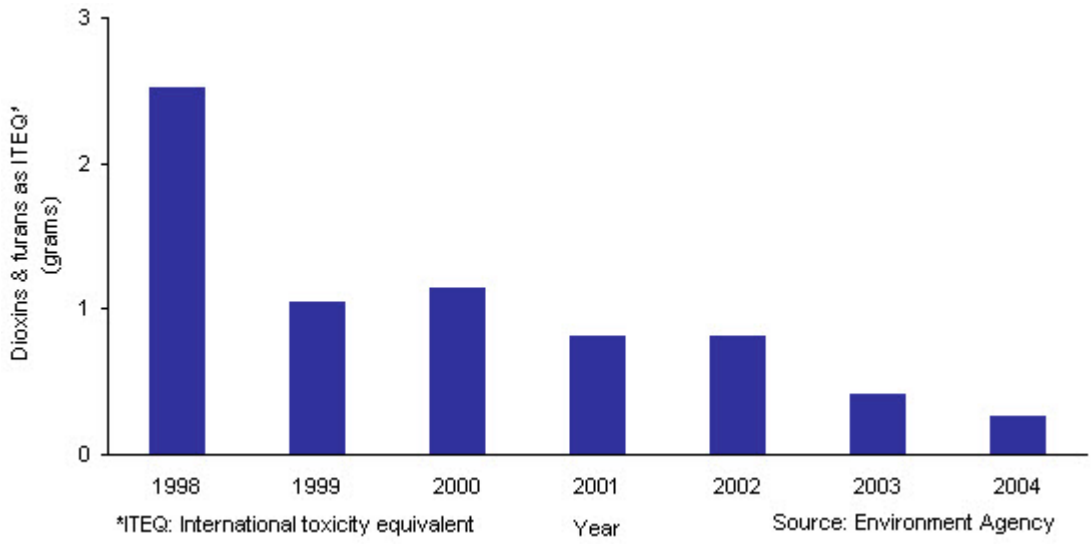
The results of one such review were published in the year 2000 by the Independent Scientific Advisory Committee on Carcinogenicity (COC). The COC reviewed a study carried out by the Small Area Health Statistics Unit (SAHSU), which investigated the cancer incidence of over 14 million people living near to 72 solid waste incinerators. The results of the review were issued to the Department of Health as a statement (COC/00/S1 – March 2000). The COC concluded that they were '*reassured that the 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*'. The statement also concluded that '*at the present time, there was no need for any further epidemiological investigations of cancer incidence near municipal solid waste incinerators'*.

These conclusions were made based upon the emissions from older incinerators that were operating prior to the implementation of the Waste Incineration Directives. The Municipal Waste Incineration Directive (1989), Hazardous Waste Incineration Direction (1994) and, most recently, the Waste Incineration Directive (2000) introduced increasingly stringent standards for pollution prevention, including tighter limits for key pollutants, such as particulates, dioxins and heavy metals. Therefore, the potential health risks posed by the modern incinerators that are designed to achieve the more stringent WID emission limits are likely to be even smaller. This reduced risk is supported by reports such as the UK Soil and Herbage Pollutant Survey (2007) carried out by the Environment Agency which contained figures published by DEFRA (2002) providing estimates of total dioxin emissions from different sources in 1990 and 1999. The results (shown in the table below) demonstrate a significant reduction in dioxin emissions from municipal solid waste incineration plants between 1990 and 1999.

	1990	1999
Total emissions (g I-TEQ/year)	1142	345
% contribution from:		
Power stations	3	5
Domestic burning	1	3
Iron & steel manufacturing	6	16
Non-ferrous metal industries	3	7
MSW incineration	**52**	**1**
Other incineration	5	10
Transport	2	1
Accidental fires & open burning	11	20
Other sources	10	23

The results of the UK Soil and Herbage Pollutant Survey also found that the level of dioxins in soil and vegetation has fallen by approximately 70% over the last 20 years.

Emissions data reported to the Environment Agency has also demonstrated that concentrations of dioxins emitted from UK MSW incinerators have continued to decline from 1998 to 2004, as shown on Graph 1 below (source: http://www.environment-agency.gov.uk/research/library/data/58725.aspx).



Graph 1: Dioxin emissions from municipal waste incinerators, 1998 to 2004

An independent review of evidence on the health effects of municipal waste incinerators was published by DEFRA in 2004, entitled "Review of the Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes". The review considered the results of 23 high quality studies of the patterns of disease around MSW incinerators and four review papers looking at the health effects of such plants. The report 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 and birth defects.

The findings of such recent investigations have also received the support of the UK Health Protection Agency (HPA), an independent body that aims to protect the health and well-being of the UK population and provides support and advice to the NHS, local authorities, the Department of Health and others. The local Primary Care Trust (PCT) and the HPA were consulted by the Environment Agency during the environmental permit application process. Details of the response provided by the PCT and HPA to the consultation on this application can be found in Annex 5.

In 2005 the HPA issued a public statement on municipal solid waste incineration, specifically regarding the potential health impacts of such processes. The public statement concluded that '*incinerators emit pollutants into the environment but provided they comply with modern regulatory requirements, such as the Waste Incineration Directive, they should contribute little to the concentrations of monitored pollutants in ambient air. Epidemiological studies, and risk estimates based on estimated exposures, indicate that the emissions from such incinerators have little effect on health*'.

In September 2009 the HPA reviewed the above statement and produced a document entitled "The Impact on Health of Emissions to Air from Municipal Waste Incinerators". There is no change to the Agency's general position and the comments are summarised as follows:

"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. This view is based on detailed assessments of the effects of air pollutants on health and on the fact that modern and well managed municipal waste incinerators make only a very small contribution to local concentrations of air pollutants. The Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment has reviewed recent data and has concluded that there is no need to change its previous advice, namely that any potential risk of cancer due to residency near to municipal waste incinerators is exceedingly low and probably not measurable by the most modern techniques. Since any possible health effects are likely to be very small, if detectable, studies of public health around modern, well managed municipal waste incinerators are not recommended."

This statement concurs with our previous comments that our assessment of emissions for the proposed plant will not result in a significant risk to human health.

C7.3.3 Impact of proposed installation upon local habitat sites

Impact upon European Designated Habitat Sites

The installation is located approximately 700m from the Severn Estuary SAC/SPA/Ramsar and 9.9km from Cardiff Beechwoods SAC, and is therefore relevant for consideration against the Habitats Regulations.

The proposed installation has been assessed following guidance agreed jointly with CCW and English Nature. The detailed assessment is summarised below.

A sensitivity matrix was used to consider the interest features of the European sites, and which hazards they may be sensitive to. This identifies that toxic contamination and nutrient enrichment are relevant hazards for assessment.

The following impact mechanisms and potential pollutants are reviewed in subsequent sections of this assessment.

Toxic contamination impact can result from the direct affect of the concentration of particular pollutants dispersed within the air at the receptor. Impacts from nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and ammonia (NH_3) could affect the features of the receptors in this way.

Toxic contamination could also result from the aerial deposition to ground of metals that could be released from the incineration process via the exhaust stack. The potential impact from Cadmium, Mercury, Arsenic, Chromium, Copper, Lead and Nickel are considered for assessment via this mechanism.

Nutrient enrichment can result from the aerial deposition to ground of nitrogen dioxide and ammonia.

The applicant has provided detailed dispersion modelling (AERMOD) as part of their application. The modelled domain grid covers a range of ecological receptors including the EU Habitats Directive sites - Cardiff Beechwoods and the Severn Estuary SAC, SPA and Ramsar - which are considered to be the relevant sites for this assessment, according to Stage 1 distance criteria. Sixty eight discrete receptor locations have been defined within the grid, to represent the extent of all ecological receptors identified to be within the modelled domain. Relative to the proposed installation, the location of the relevant sites is summarised below.

Impact Summary - Severn Estuary SAC/SPA/Ramsar						
Pollutant and Benchmark Unit	Benchmark or EAL	Process Contribution (PC)Grid Max	PC/EAL %	Back-ground	PEC	PEC/EAL %
Direct Impacts						
NOx (µg/m³)	30	0.78	2.6	25.5**	26.28	87.6
SOx (µg/m³)	20	0.20	1.0	4.3	4.5	22.5
Ammonia (µg/m³)	3	0.024	0.8	0.8	0.824	28.0
HF (µg/m³)*	5*	0.11*	2.2*	No Data	N/A	N/A
Deposition Impacts						
N Deposition (kg N/ha/yr)	30 - 40	0.235	0.8	14.6	14.84	49.5
Acidification (Keq/ha/yr)	4.0 Not sensitive	0.04	1.0	1.44	1.48	37.0
Cadmium ($mg/m^2/day$)	0.009	0.000008	0.09	No Data	N/A	N/A
Mercury ($mg/m^2/day$)	0.004	0.00026	6.5	No Data	N/A	N/A
Arsenic ($mg/m^2/day$)	0.02	0.000017	0.08	No Data	N/A	N/A
Chromium ($mg/m^2/day$)	1.5	0.000017	<0.01	No Data	N/A	N/A
Copper ($mg/m^2/day$)	0.25	0.000017	<0.01	No Data	N/A	N/A
Lead ($mg/m^2/day$)	1.1	0.000019	<0.01	No Data	N/A	N/A
Nickel ($mg/m^2/day$)	0.11	0.000019	0.02	No Data	N/A	N/A

* HF. The recorded Process Contribution is a max Short Term (1 hour average value) from the Dispersion Modelling Report - no Long Term predicted PC value is available. The Bench Mark/EAL figure is the 'Daily Average' (shortest time frame) value obtained from Apis. The predicted Daily Average Process Contribution is likely to be approximately 50% of this value using H1 assumptions.

** NOx. Apis does not provide a background NOx value for this location, so the background value for the adjacent land side grid square has been recorded. The NOx process contribution for all other discretely modelled receptors within the domain for this site are significantly below 1% of the relevant benchmark value.

Metal Deposition. The recorded Process Contribution figures are maximum deposition values from the total modelled domain, and are therefore conservative, particularly given the overall extent of the Severn Estuary site. Metal deposition has not been modelled for discrete receptors within the domain grid. It should also be noted that with the exception of Cadmium, the max predicted airborne concentrations of all metals are significantly below 1% of the relevant concentration benchmark values.

Impact Summary - Cardiff Beech Woods (UK0030109)						
Pollutant and Benchmark Unit	Benchmark or EAL	Process Contribution (PC)Grid Max	PC/EAL %	Back-ground	PEC	PEC/EAL %
Direct Impacts						
NOx (µg/m³)	30	0.03	0.1	23.4	23.43	78.2
SOx (µg/m³)	20	0.01	0.05	2.4	2.41	12.1

Impact Summary - Cardiff Beech Woods (UK0030109)						
Pollutant and Benchmark Unit	Benchmark or EAL	Process Contribution (PC)Grid Max	PC/EAL %	Back-ground	PEC	PEC/EAL %
Ammonia (µg/m³)	1	Insignificant*	N/A	1.3	N/A	N/A
HF (µg/m³)	5	Insignificant*	N/A	N/A	N/A	N/A
Deposition Impacts						
N Deposition (kg N/ha/yr)	10-15	0.015	0.15	34.3	34.32	343
Acidification (Keq/ha/yr)	11.13	0.03	0.27	2.82	2.85	9
Metals ($mg/m^2/day$)		Insignificant*	N/A	N/A	N/A	N/A

* Ammonia, HF and Metals deposition. Although no discrete modelling outputs are available for these pollutants at this receptor, given the distance (9.9km) and orientation of it from the source, and taking reference from the dispersion pattern of other modelled pollutants within the overall receptor domain; it is considered that any potential impact from these pollutants at this location will be insignificant.

Conclusion

Severn Estuary SAC/SPA/Ramsar (UK0013030)

Although the predicted process contributions for Nitrogen Dioxide and Mercury deposition are above 1% of the relevant benchmarks, the dispersion modelling study has used emission concentration release values that are equivalent to the emission limits described in the WID, and assumed that emissions will be continuously at this level throughout the full calendar year.

Emission data collated from currently operational MSW incineration plant utilising similar technology and waste input, has demonstrated that actual emissions are significantly below the WID defined levels (as used in this study), particularly for metals and particulates. In respect to nitrogen dioxide, all other discretely modelled receptors within the domain for this receptor are significantly below 1% of the relevant benchmark for this pollutant. Given these and other practical considerations, we do not believe that the proposed facility will have a significant effect on the Severn Estuary SAC/SPA/Ramsar.

Cardiff Beech Woods (UK0030109)

The predicted process contributions are all considered to be below 1% of the relevant benchmarks. Although the model study has not provided discrete process contribution values for Ammonia, HF or metal deposition at this receptor, given the distance of this site from the proposed facility emission source (9.9 km) and the dispersion pattern of other pollutants relative to the predicted values for the much closer Severn Estuary site; we do not believe there will be any significant affect on Cardiff Beech Woods SAC.

The assessment concludes that there will be no likely significant effect on a European Site. CCW were consulted by the submission of an Appendix 11

assessment and they agreed with our conclusion that operation of the installation would have no likely significant effect on the interest features of the protected sites.

Impact upon Sites of Special Scientific Interest (SSSI)

There are no SSSI's within the relevant screening distance (2 km) from the installation.

Impact Upon Non-statutory Conservation Sites

The Cardiff Bay Barrage wetland area is approximately 1.5km to the south west of the installation. However, this area is upwind of the prevailing wind direction and the impact assessment described above, for the Severn Estuary SAC/SPA/Ramsar which is much closer to the installation, concluded that there would be no significant impact on the features of that site. We therefore conclude that there will be no significant impact on the Barrage wetland areas.

C7.3.4 Assessment of impact due to Abnormal Operations

Article 13 of the WID provides the Operator with some operational flexibility to resolve problems on the plant without initiating a complete shutdown. Operations taking advantage of this flexibility are referred to as "abnormal operations".

WID abnormal operations are described (defined in Schedule 7 of the Permit) as any technically unavoidable stoppages, disturbances, or failures of the abatement plant or the measurement devices, other than continuous emission monitors for releases to air of particulates, TOC and/or CO, during which the concentrations in the discharges into air may exceed the normal emission limit values.

WID abnormal operations are limited by the WID to no more 4 hours of continuous operation and to no more than 60 hours of total operation in any calendar year. Abnormal operations could result in increased levels of emissions for short periods of time. These raised levels of emissions will not have a significant long-term impact on the environment, as the maximum annual period of abnormal operation (60 hours) is relatively short when compared with an expected 8,000 hours per year of total operating hours for this type of plant (i.e. <1%). These periods of abnormal operation are specified and limited through Condition 2.3.10 of the Permit.

WID abnormal operations have the potential to have a greater short-term impact on the environment. We have undertaken an assessment of the potential increase in the short-term impact of emissions from the installation when operating for periods of up to 4 hours at abnormal operating condition emission levels.

C7.3.4.1 Failure of Monitoring Devices

Abnormal operation resulting from failure of a monitoring device does not in itself directly affect emissions. However, the Applicant has stated that they will provide a back-up CEMS equipment which will be switched into full operation in the event that there is any failure in the regular monitoring equipment. The back-up monitor measures the same parameters as the operating CEMS. In the unlikely event that the back-up CEMS also fail, the permit requires (Condition 2.3.10) that the burning of waste shall cease.

C7.3.4.2 Failure of Pollution Control Equipment

Failure of one or more items of pollution control equipment has the potential to cause increased emissions for a period of up to 4 hours after which waste must cease to be charged and the plant shut down. Failure of the following items of abatement equipment has been considered:

- the SNCR equipment, leading to increased emissions of nitrogen oxides;
- the bag filter, leading to increased emissions of particulate matter, metals and dioxins/furans;

- the acid gas abatement system, leading to increased emissions of sulphur dioxide, hydrogen chloride and hydrogen fluoride;
- the activated carbon injection system leading to increased emissions of metals and dioxins/furans.

The Agency has estimated the likely impact on short term air quality standards resulting from failure of the above abatement systems by scaling the predicted Process Contribution concentrations produced during normal operation by the ratio of the normal to abnormal emission concentrations. It should be noted that each incineration line within the installation has its own dedicated abatement equipment, and the likelihood of corresponding abatement plant failing simultaneously on each line is very unlikely. However, the assessment below takes the very conservative approach that simultaneous failure of equipment on each line could occur, and the abnormal operation emission levels have been calculated on this basis.

The abnormal emission concentrations have been derived as follows:

SNCR System Failure (Nitrogen Dioxide Control)

The BREF indicates that SNCR systems are capable of abating 40 – 60% of the NOx formed in the combustion cell. The short term limit set for NO_2 during normal operation is 200 mg/m^3. Therefore assuming the abatement system was operating at its maximum capability of 60% during normal operation to achieve the above short term limit, total failure of the abatement system would result in emissions increasing by a factor of 2.5. (The short term unabated emission of NO_2 would therefore increase to 500 mg/m^3).

Acid Gas Abatement System Failure (SO_2, HCl and HF control)

The BREF indicates that raw flue gas (unabated) concentrations of SO_2, HCl and HF in the combustion gas stream from municipal waste incinerators are in the following range:

SO_2	200 – 1000 mg/m^3.
HCl	500 – 2000 mg/m^3.
HF	5 – 20 mg/m^3.

The short term limits set for SO_2, HCl and HF during normal operation are 200 mg/m^3, 60 mg/m^3 and 2 mg/m^3 respectively. Assuming a total failure of the acid gas abatement system, these pollutants could be emitted at emission concentrations corresponding to the upper values of the ranges above, during periods of abnormal operation. The following scaling factors (relative to normal operation emission concentrations) can therefore be derived to predict short term Process Contributions for these pollutants during periods of abnormal operation.

SO_2 Scaling Factor	1000/200	= 5
HCl Scaling Factor	2000/60	= 33
HF Scaling Factor	20/2	= 10

Particulate Abatement System (Bag Filter) Failure

The WID requires that short term emissions of particulate are limited to 150 mg/m^3 during any period of abnormal operation. This is also specified through Table S4.1a in Schedule 4 of the Permit. The short term limit set for particulate emissions during normal operation is 30 mg/m^3. Therefore short term emissions of particulate could increase by a factor of 5 during periods of abnormal operation. In the worst case scenario, short term emissions of PM_{10}, $PM_{2.5}$, metals and dioxins could increase by this factor.

Activated Carbon Injection Abatement System Failure (Metals and Dioxin control)

The BREF indicates that raw flue gas concentration of Dioxins can be in the range 0.5 – 10 ng/m^3. The upper value of this range is 100 times the emission limit of 0.1 ng/m^3 specified by the WID. This is equivalent to saying that the activated carbon injection system can be up to 99% efficient in abating emissions of dioxin/furan type pollutants. This is consistent with an efficiency of 98.7% reported in Chemosphere, Vol.45, No.8, and pp.1151 – 1157. Malfunction of the activated carbon injection system could therefore result in dioxin and metal emissions increasing by a factor of 100, during periods of abnormal operation due to a total failure of this abatement system.

Short term process contributions recorded in the Air Quality Impact Assessment provided in the Application have been scaled-up using the factors derived above to assess predicted impact for periods of abnormal operation.

The result on the short term environmental impact is summarised in the table below.

Pollutant	EQS / EAL	Back-ground (x2)	Factored Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
NOx (as NO_2	400	55.8	17.0	4.2	72.8	18.2
SO2	266	5.6	16.7	6.3	22.3	8.4
Particulate	50	40.6	0.75	1.5	41.4	82.7
Hydrogen chloride	750	4.6	37.0	4.9	41.6	5.5
Hydrogen Fluoride	160	2.6	1.1	0.7	3.7	2.3
Cadmium	1.5	0.00076	0.3	20.0	0.30076	20.1
Mercury	7.5	0.0052	0.6	8.0	0.6052	8.1
Arsenic	15	0.0022	0.6	4.0	0.6022	4.0
Antimony	150	-	0.6	0.4	0.60	0.4
Chromium	150	0.009	0.6	0.4	0.609	0.41
Cobalt	6	-	0.6	10.0	0.60	10.0
Copper	200	0.063	0.6	0.3	0.663	0.33
Manganese	1500	0.0239	0.6	0.04	0.6239	0.04
Nickel	30	0.00492	0.6	2.0	0.60429	2.01
Vanadium	5	0.00552	0.6	12.0	0.60552	12.1

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

Note 2 For the assessment of short term impacts, the PEC is determined by adding twice the long term background concentration to the short tem process contribution.

From the table above, the emissions of all substances except Cadmium, Cobalt and Vanadium are still considered to be insignificant at abnormal operation levels, in that the factored PC is still <10% of the short-term EQS/EAL. The table also shows that the emission of these substances during abnormal operation is not considered to have the potential to give rise to significant pollution, as the predicted environmental concentration is significantly less than 100% of the relevant short term EQS/EAL for them.

C7.3.5 Permit conditions to control emissions to air

Process controls

The principal means for ensuring that the plant's emissions to air are adequately controlled will be through the correct operation and maintenance of the incineration process, including monitoring and control of combustion in the furnaces and operation of the pollution abatement equipment. These techniques are described in Sections 7 and 10 of the application. These sections of the application, which detail key operational controls are referred to in Table S1.2 of the permit and through this these techniques are bound in as requirements of the permit to which the operator must adhere (subject to the provisions for minor operational changes and variations to the permit). Annex 1 of this document details the requirements of WID and how these have been addressed in the application and permit.

Emission limit values for releases to air

Table S4.1 of the permit identifies the emission points to air from the installation and sets emission limit values (ELVs) for the principal substances that will be emitted by the plant during normal operation (particulate matter; total organic carbon (TOC); hydrogen chloride; carbon monoxide; sulphur dioxide; oxides of nitrogen (but not CO_2, as discussed in Section C7.1.2.6). Half hourly average and daily average ELVs are set in the permit at the levels specified in the WID, which is considered to represent BAT in this case. The permit requires that these substances are monitored on a continuous basis.

In accordance with the requirements of the WID, emission limit values for periodic extractive samples are set in Table S4.1 of the permit for the following substances:
hydrogen fluoride, cadmium and thallium and their compounds; mercury and its compounds; other metals (the sum of Sb, As, Pb, Cr, Cu, Co, Mn, Ni and V and their compounds), and dioxins and furans. Continuous measurement of hydrogen fluoride is not required under the WID as suitable abatement of hydrogen chloride will ensure HF emissions are minimised. The monitoring

requirements of the permit are discussed in more detail in Section C11 of this document.

The emission limit values specified in Table S4.1 apply at all times that the incinerator is operating except during start-up and shutdown. The processes of plant start-up and shutdown are defined in Schedule 7 of the permit. The application confirms that the furnace temperature of 850^{o}C will be met and the flue-gas treatment process will be operating before any waste is burnt following start-up and that these requirements will be met until all waste has been burnt off the grate. This is bound in to the permit by virtue of the reference to the relevant section of the application in Table S1.2.

Table S4.1a specifies the emission limit values that will apply during periods of abnormal operation. Abnormal operation is defined in schedule 7 of the permit and applies only to the circumstances set out in the definition. These ELVs allow emissions of particulate matter to increase from 30 mg/m^3 to 150 mg/m^3 (as a half hourly average) for up to 4 hours as a result of failure of the abatement plant. The ELVs in Table S4.1a for TOC and CO remain the same as those set in Table S4.1 for normal operation and therefore require that good combustion conditions are maintained even under abnormal operation situations. These limits are in line with the requirements of the WID and the emission benchmarks for waste incinerators included in the SGN, which are set taking into account the guidance on BAT and obligations imposed by legislation.

Schedule 7 of the permit defines “start up“ as any period, where the plant has been non-operational, after igniting the auxiliary burner until waste has been fed to the incinerator in sufficient quantity to cover the grate and to initiate steady-state conditions. “Shutdown” is defined as any period where the plant is being returned to a non-operational state and there is no waste being charged. Thus there is a short period during shutdown when waste continues to be burned on the grate, but the ELVs are not applicable. However, the operator has stated in the application that the flue gas treatment plant will remain in service, and temperatures maintained in the furnace (850°C), until waste is completely run off the grate. Similarly, the application states that waste will not be introduced at start-up until the flue gas treatment unit is at operating temperature and the furnace has been pre-heated to 850°C. These operating techniques have been included as a condition of the permit through Table S1.2 of Schedule 1.

C7.4 Emissions to water

All uncontaminated surface water from the installation will be passed through an interceptor and an attenuation ponds prior to discharge to the off-site surface water system at release point W1. No other point source emissions to water are permitted.

C7.5 Emissions to sewer

The facility is designed with a waste water pit to store used process water from a variety of sources such as boiler drains, ash discharge overflow and rainwater runoff from potentially contaminated areas. This water is then reused within the process for bottom ash quenching. Under unusual conditions, for example, during boiler cleaning there may be a need for overflow of this water and it will be discharged to public sewer under a trade effluent consent or pumped out for final disposal by tanker. Any discharge would be controlled by the trade effluent consent and so there is no need for the Agency to set limits as releases are infrequent and capable of being treated by the sewage treatment works which in turn has limits set to protect the environment.

C7.6 Conclusions

We have reviewed the techniques used by the operator and compared these with the relevant SGN. The assessment of these against BAT is given above, specifically in Section C7.1.

We have reviewed emissions to air, to water and to sewer and the operator's assessment of the environmental impact of emissions from the installation as described above. The assessment shows that, applying the conservative criteria in H1 and elsewhere, none of the assessed emissions are considered to result in a significant environmental impact. We accept the operator's proposals for BAT relating to the environmentally insignificant emissions and have reviewed the proposals relating to emissions identified as priorities for control as detailed in Section C7.1. The proposed techniques / emission levels for priorities for control are in line with the benchmark levels contained in the SGN and WID and we consider that they are BAT for the installation, subject to the satisfactory fulfilment of the pre-operational conditions described above and listed in Table S1.4 of the permit.

We are satisfied that, with the exception of CO_2, no substances will be emitted from the Installation in significant quantities. As detailed in Section 7.1.2.6, CO_2 emissions from the Installation are potentially significant in terms of their effects on a global rather than local level. However, as previously stated, because the quantity of CO_2 emitted is determined by the capacity and efficiency of the plant, it is not appropriate to set an emission limit value in the permit for emissions of CO_2. Provided energy is recovered efficiently, there are no additional equivalent technical measures (beyond those proposed relating to the quantity and characteristics of the waste) that can be imposed that do not run counter to the purpose of the plant. As detailed in Section B3 we have reviewed the energy efficiency of the Installation and have concluded that it is BAT.

Periodic emissions monitoring has been set for nitrous oxide (N_2O) and ammonia under permit conditions to ensure that the measures taken to reduce emissions from the abatement of nitrogen oxides are controlled to minimise the overall environmental impact. ELVs have not been set for N_2O or

ammonia as there is no data available to set realistic limits and the technical measures to control them are acceptable alternatives. Improvement condition IC3 has been set, which requires the Operator to give details of how the secondary control measures for NOx will be optimised prior to operation which will ensure that emissions of N_2O and ammonia are minimised.

In order to ensure compliance with the WID, and based on BAT, ELVs have been set for nitrogen oxides, total dust, total organic carbon, hydrogen chloride, sulphur dioxide, carbon monoxide, hydrogen fluoride, cadmium, thallium, mercury, other metals (antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel, vanadium) and dioxins/furans.

The emission limit values apply at all times that the incinerator is operating except during start up and shutdown. Provisions for emissions control during start up and shutdown are described above in Section C7.3.7.

Annual mass limits are not set for the incineration process because the emission limit values based on pollutant concentration are considered to be sufficient to protect the environment and an appropriate means of regulating the plant.

It is considered that the ELVs and equivalent parameters or technical measures described above are BAT and will ensure that significant pollution of the environment is prevented and a high level of protection for the environment secured.

C8 Fugitive emissions of substances Permit condition 3.2

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

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. These matters are reviewed in Annex 1 of this document and the Agency concludes that article 8(7) is satisfied.

C9 Conditions relating to Odour Permit condition 3.3

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

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

C10 Noise and vibration

Permit condition 3.4

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent pollution from noise and vibration.

The application contained a noise impact assessment (Section 15 of the Planning Application EIA and associated Appendix 21, supplied as part of the EPR Application) which identified local noise-sensitive receptors, potential sources of noise at the proposed plant and a modelling study to predict impact at those receptors. Measurements were also taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS4142 to compare the predicted plant rating noise levels with the established background levels. The assessment concluded that during daytime and nightime periods, the operation of the plant at the predicted noise emission values would result in noise levels that are significantly below existing background values, and would therefore be unlikely to cause complaints at any of the assessment locations.

However, to confirm the above conclusion that noise levels will be controlled and kept at acceptable levels, pre-operational condition PO06 has been set in the permit requiring the operator to propose and implement a programme of monitoring to establish noise levels during plant commissioning and operation.

C11 Monitoring

Permit condition 3.5

C11.1 Monitoring during normal operations

We have decided that monitoring should be carried out for the parameters listed in tables S4.1 to S4.5 in schedule 4 using the methods and to the frequencies specified in those tables. These monitoring requirements have been imposed in order to demonstrate compliance with the emission limit values imposed on emissions to air. The methods for continuous and periodic monitoring of emissions to air are in accordance with the Agency's M2 Guidance for monitoring of stack emissions to air.

The ammonia monitor will be certified to MCERTS although it is listed in Table S4.4 not Table S4.1 because there is no emission limit value for ammonia at the present time. Monitoring of N_2O and ammonia has been set as a requirement of the permit to ensure that emissions from the use of urea in the NOx abatement process result in minimum impact upon the environment.

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.

C11.2 Monitoring during abnormal operations arising from failure of the installed CEMS

The Applicant will provide a back-up CEMS which will be switched into full operation immediately in the event that there is any failure in the regular monitoring equipment. The back-up monitor measures the same parameters as the operating CEMS. In the unlikely event that the back-up CEMS also fail, the permit requires (Condition 2.3.10) that the burning of waste shall cease.

C11.3 Other monitoring requirements

Other monitoring requirements have been set by the Agency in Condition 3.5.1 and Schedule 4 of the permit. These monitoring requirements have been imposed in order to enable correction of measured concentrations of substances to the appropriate reference conditions; to gather information about the performance of the SNCR system; to deliver guidance from DEFRA that dioxin-like PCBs and PAHs should be monitored; and to deliver the requirements of the WID for monitoring of residues and temperature in the combustion chamber.

In addition, Improvement Condition IC4 requires an exercise to be undertaken to determine the size distribution of the particles emitted from the stacks to identify the fractions in the PM_{10}, $PM_{2.5}$ and $PM_{1.0}$ ranges. This reflects the latest scientific research which indicates that very fine particles have the most potential to adversely affect health. This is a standard improvement condition being imposed on all incinerators in order to gather information on the contribution of waste incineration generally to emissions of very fine particles.

C11.4 Continuous emission monitoring for mercury and dioxins

The WID specifies manual extractive sampling for mercury and dioxins, however continuous emission monitoring equipment for mercury and continuous sampling equipment for dioxins is now available. The Agency has reviewed the applicability of these techniques to the installation. Until recently there was no CEM which could measure solid phase (particulate) mercury as well as vapour phase mercury. However, there are now instruments which claim to measure total mercury, such as the MERCEM instrument manufactured by Sick-Maihak, which is MCERTS certified. The CEN (Committee European de Normalisation) has recently published a standard for total mercury to be determined by automated measuring systems (EN 14884:2005). However the British Standards Institute has objected to the manner in which the standard has been developed and believes that it does not entirely fulfil its purpose.

In the case of dioxins, the equipment is capable of taking a sample for an extended period (several weeks), but the sample must then be analysed in the

conventional way. Despite good ability to track the same trends in changing dioxin concentrations, systematic differences are observed between continuous sampling and manual sample train measurements, in which continuous sampling records dioxin concentrations higher than manual sample trains. 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. Manual sample trains are more applicable for dioxin monitoring against an emission limit value in accordance with WID requirements where dioxin methods are required to meet EN 1948. Cross-stack sampling in accordance with EN 13284-1 (the low dust standard) is a pre-requisite of EN 1948, whereas continuous sampling techniques are designed for operation at one, or at most two, fixed points across the stack.

For either system 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 and this makes it difficult for the Agency to act unilaterally in the case of UK incinerators. 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 emissions it is not justifiable to require the operator to install continuous monitoring for these substances.

In accordance with it's legal requirement to do so the Agency is always reviewing the development of new methods and standards and their performance in industrial applications. In particular the Agency considers continuous sampling systems for dioxins to have promise as a potential means of improving process control and obtaining more accurate mass emissions estimates. We will include a requirement for continuous measurement of dioxins and mercury no later than when the European Commission imposes this under Article 11(13) of the WID.

C12 Reporting

We have specified reporting requirements in Schedule 5 for the following reasons:

- reporting of continuous monitoring of emissions to air is required quarterly, to allow timely review by the Agency
- reporting of periodic monitoring required by the WID is required every three months for the first year of operation and every six months thereafter, in line with WID requirements for monitoring
- reporting of loss on ignition of bottom ash is required monthly during the first year of operation and quarterly thereafter, in line with WID requirements for monitoring
- reporting of content of heavy metals, dioxins/furans and dioxin-like PCBs of bottom ash is required monthly during the first year of operation and quarterly thereafter, in line with WID requirements for monitoring

- reporting of content of heavy metals, dioxins/furans and dioxin-like PCBs of APC residues is required monthly during the first year of operation and quarterly thereafter, in line with WID requirements for monitoring
- reporting of the total mass of waste accepted, and the mass of individual fractions of waste is required annually, to allow the Agency to review compliance with permit conditions
- reporting of electricity generated, electricity exported to the National Grid, and steam exported (if any) is required annually to allow the Agency to audit the efficiency with which energy is recovered from waste. The requirement to report steam export will prompt an annual re-examination of the possibility of finding a customer for surplus heat
- reporting of water, energy and named raw material usage, and the generation, recycling and disposal of bottom ash is required annually to enable the Agency to assess the environmental efficiency of the installation.

C13 Miscellaneous

There are no other issues.

Part D : 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.

D1 The EPR 2010 and related Directives

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

D.1.1 Schedules 1 and 7 to the EPR 2010 – IPPC Directive

We address the requirements of the IPPC Directive in the body of this document.

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.

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 Cardiff County Council to grant planning permission on 29/06/10.
- The report and decision notice of the local planning authority accompanying the grant of planning permission.
- The response of the Environment Agency to the local planning authority in its role as Consultee to the planning process.

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

D.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, as well as other specified requirements.

We must give effect to Article 4 of the WFD, which requires that waste is *recovered* or *disposed* of without endangering human health and without using processes or methods which could harm the environment, and in particular:
(a) without risk to water, air or soil, or to plants or animals;
(b) without causing a nuisance through noise or odours;
(c) without adversely affecting the countryside or places of special interest.

We have addressed these objectives elsewhere in this document. The conditions of the Permit protect the environment and ensure that there is no harm to any features identified above.

Schedule 9 also requires that records referred to under Article 14 are kept and made available to the Agency on request. Conditions relating to the collection, maintenance, storage and availability of records form part of the Permit.

We are also required to give effect, where *disposal* operations are involved, to Article 5, which requires that appropriate measures are taken to establish an integrated and adequate network of disposal installations, taking account of the best available technology not involving excessive costs. The network must enable the Community as a whole to become self-sufficient in waste disposal and the Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialised installations for certain types of waste. This network must enable waste to be disposed of in one of the nearest appropriate installations, by means of the most appropriate methods and technologies in order to ensure a high level of protection for the environment and public health.

Waste planning is primarily the responsibility of the Waste Disposal Authority and the Local Authority. In determining this Application we have had regard to the National Waste Strategy for Wales, we have also had regard to Technical Advice Note 21 (TAN 21) published by the Welsh Assembly Government (WAG). We have also had regard to the waste policies of the Local Authority including the objectives set out in the sub-regional 'Project Gwyrdd', to which Cardiff City Council is a participant Authority.

We note that the Application has now been granted planning permission by the Cardiff City Council; and so are satisfied that the Application has been

assessed by the relevant authorities that it is in compliance with the relevant policies pursuant to Article 5.

D.1.3 Schedule 13 to the EPR 2010 – Waste Incineration Directive

The way in which this Direction has been implemented is summarised in Annex 1.

D.1.4 Schedule 22 to the EPR 2010 – Groundwater, Water Framework and Groundwater Daughter Directives

To the extent that it authorises the 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 installation are permitted. The Permit also requires material storage areas to be designed and maintained to a high standard to prevent accidental releases.

D1.5 Directive 2003/35/EC – The Public Participation Directive

Regulation 59 of the Regulations requires the Agency to prepare and publish a statement of its policies for complying with its public participation duties. The Agency has published such a document and this Application is being consulted upon in line with our public participation statement. This satisfies the requirements of the Public Participation Directive.

D.2 National primary legislation

D.2.1 Environment Act 1995

D.2.1.1 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 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.

D.2.1.2 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 existing requirements are sufficient.

D.2.1.3 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.

D.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.

D.2.3 Countryside and Rights of Way Act 2000 (CROW 2000)

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

D.2.4 Wildlife and Countryside Act 1981 (WCA 1981)

Under section 28G of the Wildlife and Countryside Act 1981 the 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 281 the Agency has a duty to consult Natural England/Countryside Council for Wales in relation to any permit that is likely to damage SSSIs.

The Environment Agency's assessment concluded that the installation is not likely to cause damage to the features of any SSSI, as there are no SSSI's within the relevant screening distance from the Installation. The habitat assessment is detailed in Section C7.3.3.

D.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.

D.3 National secondary legislation

D.3.1 The Conservation of Natural Habitats and Species Regulations 2010

The proposed installation has been assessed following guidance agreed jointly with CCW and English Nature. The assessment has concluded that there will be no likely significant effect on a European Site. CCW were consulted by the submission of an Appendix 11 assessment and they subsequently confirmed their agreement with our conclusion that operation of the Installation was unlikely to cause any adverse effect to the interest features of protected sites. The habitat assessment is detailed in Section C7.3.3.

D.3.2 Water Framework Directive Regulations 2003

Consideration has been given to whether any additional requirements should be imposed in terms of the 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.

D.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 C7.1.2.7 of this document.

D.4 Other relevant EU legislation

D.4.1 Hazardous Waste Directive (91/689/EEC)

Consideration has been given to whether any additional requirements should be imposed, but it is considered that its requirements are already met by the permit conditions.

D.4.2 Solvent Emissions Directive (SED) 1999

The Installation does not include any activity listed in Annex I of the Directive or activity which, whilst listed in Annex I, is above the relevant threshold in Annex IIA so no provisions of the SED apply.

D.4.3 Waste Oils Directive

The installation does not contain waste disposal or recovery activities involving waste oils to which the Directive applies.

D.4.4 Hazardous Waste Directive

The installation does not contain hazardous waste disposal or recovery activities to which the Directive applies.

D.5 Other relevant legal requirements

D.5.1 Local Democracy, Economic Development and Construction Act 2009

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.

ANNEX 1 : APPLICATION OF THE WASTE INCINERATION DIRECTIVE

1 Introduction

The WID is transposed into domestic law by the Environmental Permitting (EP) Regulations 2010. Regulation 35 requires the Regulator to ensure that the provisions in Schedule 13 (provision in relation to waste incineration) have effect. Schedule 13 lists the provisions of the WID with which compliance has to be ensured when the regulator is exercising its Permitting function.

This Installation is an incineration plant as defined by the WID and therefore must comply with the requirements.

1.1 Paragraph 3 of Schedule 13 to the EP Regulations requires an application for an EP Permit relating to a "waste incineration Installation" to contain the information specified in Article 4(2) of the WID. Specifically, this information must include a description of the measures which are envisaged to guarantee that –

(a) the plant is designed, equipped and will be operated in such a manner that the relevant requirements of the WID are met, taking into account the categories of waste to be incinerated;
(b) the heat generated during the incineration process is recovered as far as practicable (for example through combined heat and power, the generating of process steam or district heating);
(c) the residues will be minimised in their amount and harmfulness and recycled where appropriate;
(d) the disposal of the residues which cannot be prevented, reduced or recycled will be carried out in conformity with national and Community legislation.

1.2 Paragraph 4 of Schedule 13 to the EP Regulations requires the regulator to exercise its Permit making functions in such a way as to ensure compliance with a series of provisions of the WID. The following section addresses each of the specified provisions and how compliance will be ensured. The Agency is satisfied that, when waste is burnt in the Installation, the requirements of the EP Regulations and the WID will be complied with.

2 Specified provisions of the WID

2.1 Article 4(3) - 4(5) - Application and Permit

2.1.1 The Article 4(3) – 4(5) requirements are:

(a) the application must show that the proposed measurement techniques for emissions into the air comply with Annex III and, as regards water, comply with Annex III paragraphs 1 and 2. Detailed consideration of this point follows at paragraphs 2.8.1 to 2.8.10. Discussions with the Applicant and the information provided in the Application complied with this requirement.

(b) the Permit must comply with any applicable requirement laid down in the Urban Waste Water Treatment Directive (the "UWWTD"), the IPPC Directive, the Air Quality Framework Directive (the "AQFD"), the Dangerous Substances Directive (the "DSD") and the Landfill Directive (the "LFD"). Of these, the IPPC Directive's requirements are delivered via the EP Regulations, as are the applicable requirements of the UWWTD, the AQFD and the DSD. The LFD is not relevant to the Installation.

(c) the Permit must list explicitly the categories of waste that may be treated; using the categories set out in the European Waste Catalogue ("EWC") and contains information on the quantity of waste where appropriate. Condition 2.3.3 and Table S3.2 in Schedule 3 of the Permit list the types of wastes that are Permitted to be burnt at the Installation and provide the EWC numbers.

(d) the Permit shall include the total waste incinerating capacity of the plant. Condition 2.3.3 and Table S3.2 in Schedule 3 of the Permit contain this information.

(e) the Permit shall specify the sampling and measurement procedures used to satisfy the obligations imposed for periodic measurements of each air and water pollutant. Conditions 3.5.1 and Tables S4.1, S4.1(a), S4.2, S4.3 and S4.4 in Schedule 4 of the Permit fulfil this requirement, and specific monitoring conditions are discussed below at sections 2.7 and 2.8.

2.2 Article 5 - Delivery and reception of waste

2.2.1 Article 5 requires all necessary precautions to be taken concerning delivery and reception of wastes, in order to prevent or minimise pollution. The EP Regulations require Installations to be operated in order to prevent or minimise pollution. Volume 2 of the Application defines how this will be carried out at the Installation and condition 2.3.1 requires that appropriate measures are taken. Incoming wastes are required to be monitored by condition 2.3.3 and are stored in order to prevent pollution of air, groundwater, soil and surface water as well as odours and noise (Permit Sections 3.2, 3.3 and 3.4 describe the measures that must be taken to prevent such pollution). Article 5(2) requires that the Operator determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste. Volume 2 of the application describes procedures for the reception and monitoring of incoming waste that require that wastes are categorised on arrival at the plant.

2.3 Article 6 (except for the last indent of Article 6(4)) - Operating Conditions

2.3.1 Article 6(1) sets out requirements for incineration plants such as Municipal Waste Incinerators. It states that such plants should be:

(a) Operated in order to achieve a level of incineration such that the slag and bottom ashes Total Organic Carbon (TOC) is less than 3% or their loss on ignition (LOI) of the dry weight of the material is less than 5%.

(b) Designed, equipped, built and operated in such a way that the gas resulting from the incineration of waste is raised, after the last injection of combustion air, in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of 850ºC for two seconds, as measured near the inner wall or at another representative point of the combustion chamber.

(c) The incineration plant must be equipped with at least one auxiliary burner. The burner must switch on automatically when the temperature of the combustion gases after the last injection of combustion air falls below 850 °C. The auxiliary burner must be used for start-up and shut-down to ensure that the temperature 850 °C is maintained at all times and as long as unburnt waste is in the combustion chamber. During start-up and shut-down or when the temperature of the combustion gas falls below 850 °C, the auxiliary burner must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil as defined in Article 1(1) of Council Directive 75/716/EEC, liquefied gas or natural gas.

2.3.2 a) Conditions 3.5.1 (Monitoring) and Table S4.5 ensure that the Installation is operated such that the loss on ignition of the dry weight of the material, of the slag and bottom ash, is less than 5%.

b) (i) Condition 2.3.6 limits the charging of waste into the incinerator to periods of normal operation, when operating temperatures will be in excess of 850 °C after the last injection of combustion air

b) (ii) Volume 2 Section 4 of the Application provides a statement confirming compliance with the minimum 2-second residence time at 850 °C of the gases from the combustion of waste after the last injection of combustion air.
Volume 2 Section 4 of the Application specifies the representative point where the temperature for compliance is measured. Condition 2.3.1 ensures that the Installation is operated in accordance with that part of the Application. Pre-operational condition PO01 requires the operator to provide a plan to demonstrate how validation of combustion conditions shall comply with indicative BAT as defined by Section 2.1.4.1 of Technical Guidance Note IPPC S5.01 and with the requirements of the WID.

c) Condition 2.3.7 requires the operation of at least one auxiliary burner at start-up or shut-down or whenever the operating temperature fall below 850°C, as long as unburned waste is present in the combustion chamber. Condition 2.3.7, also Permits only the use of fuels which will result in no higher

emissions than those arising from gas oil, liquefied gas or natural gas unless the specified temperature above is maintained.

2.3.3 Article 6(3) requires incineration plant to operate a system to prevent using waste as a feedstock during start-up and shut-down, whenever the temperature fails to meet the required levels, or when the CEMs show exceedences due to disturbances or failure of abatement. This requirement is addressed by condition 2.3.6.

2.3.4 Article 6(4) provides that different operating conditions (residence time and temperature) may be authorised, provided that the conditions of the Directive are met. Derogation from the operating requirements is allowed only when, the mass and the organic content of the slag and bottom ashes from the incinerator will be no more than that, which would have been expected, if the operating conditions had been the same as those without the derogation. No derogation from specified operating conditions is required.

2.3.5 Article 6(5) requires incineration plant to be designed, equipped, built and operated to ensure that emissions to air do not give rise to significant ground level pollution. Emissions to air and their ground-level impact are discussed in the body of this document, and the Agency is satisfied that the WID requirement is fulfilled.

2.3.6 Article 6(6) requires that any heat generated from the process shall be recovered as far as practicable. The heat generated by the incineration of waste will be used to generate electricity via a steam turbine. There are no proposals to utilise the residual waste heat remaining after steam generation. The proposed use of energy was assessed against the BAT sector specific guidance (IPPC S5.01) which is detailed in the main body of this document. It advises that the use of energy for CHP 'should be considered'. It goes on to advise that steam should be used to generate electricity and waste heat 'recovered unless to do so can be demonstrated not to represent BAT. All opportunities for CHP and district heating should be explored'.

The remaining heat after electricity generation should be used as far as practicable. The site is located in an industrial area surrounded by commercial and industrial properties. The operator currently recognises the potential to provide surplus heat to local businesses and discussions are ongoing though no commitments have been made at this stage. In order to review this matter later on, pre-operational condition PO08 of the permit requires the operator to carry out a comprehensive review of the available heat recovery options prior to commissioning in order to ensure that waste heat from the plant is recovered as far as possible.

The Permit includes a condition requiring the applicant to provide and maintain outlets for waste heat on the plant and to review the practicability of CHP at least every 2 years.

In the event that practicable options for recovery are identified they will be required to be implemented, and a variation to the Permit will be made. In the event that following the review the operator does not identify options for recovery but the Agency nevertheless considers options exist then the Agency will modify the Permit as it considers appropriate.

Ongoing compliance with Article 6(6) will be required as part of the ongoing maintenance of the Permit. Condition 1.3.3 has been included in the Permit to require the practicability of waste heat recovery to be reviewed every 2 years. This can also be addressed during the periodic Permit reviews required by the Regulations.

The Agency is satisfied that the provisions of Article 6(6) are currently met. By virtue of the conditions described above this will remain the case when the site becomes operational.

2.3.7 Article 6(8) requires management of the Installation to be in the hands of a natural person who is competent to manage it. Condition 2.3.1 and conditions 1.1.1 to 1.1.3 of the Permit fulfil this requirement.

2.4 Article 7(1) – 7(4) - Air emission limit values

2.4.1 Article 7(1) requires incineration plants to be designed, equipped, built and operated to comply with the ELVs in Annex V. The Applicant has proposed to operate the incinerator to comply with the Annex V requirements. Conditions 3.1.1 and 3.1.2 and Tables S4.1 and S4.1a require the Applicant to comply with ELVs as laid out in Annex V as a minimum.

2.4.2 Article 7(3) requires the results of measurements made to verify compliance with the ELVs to be standardised in accordance with Article 11. Schedule 7 of the Permit contains details of this standardisation requirement (Article 11 compliance is considered further below).

2.5 Article 8(1) – 8(7) - Water discharges from the cleaning of exhaust gases

2.5.1 Article 8(1) to (6) addresses conditions for water discharges from the cleaning of exhaust gases. There will be no discharges of such water from the Installation, and therefore the provisions of the Article are not relevant. Condition 3.1.1 prohibits any such release.

2.5.2 Article 8(7) requires that incineration plant sites shall be designed to prevent the unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. Article 8(7) also

requires that storage capacity be provided for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting operations. The storage capacity shall be adequate to ensure that such waters can be tested and treated before discharge where necessary. Surface water run-off is contained.

Under normal operating conditions, clean rainwater is segregated from any sources of contamination by collection in a separate drainage system. Sections 11 of Volume 2 of the Application demonstrates that the storage capacity provided for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting operations is adequate to ensure that such waters can be tested and treated before discharge where necessary. The Agency considers that Article 8(7) is therefore satisfied.

2.6 Article 9 – Residues

2.6.1 Article 9 requires residues from incineration plants to be minimised in their amount and harmfulness, and residues to be recycled where appropriate. Residues from the facility will comprise bottom ash (which will be non-hazardous and used as aggregate), boiler ash and APC residues (which will be hazardous, and will be sent to landfill at an appropriately licensed site). The responses in Section 9 of Volume 2 of the Application define how this will be carried out at the Installation and condition 1.5.1 requires that appropriate measures are taken.

2.6.2 Article 9 also requires dry residues and dust to be transported to prevent dispersal into the environment. Condition 3.2.1 ensures that this requirement is complied with. Condition 1.5.1 together with condition 2.3.1 and schedule 1 table S1.2 ensures that wastes arising from the Installation are disposed of or recovered in accordance with the Application. The Application defines suitable disposal and recovery routes. Condition 2.3.1 requires that the Agency is notified of any change to the techniques defined in table S1.2, which includes disposal and recovery routes.

2.6.3 Article 9 requires residues from incineration plants to be tested (as appropriate) for their physical and chemical characteristics and their polluting potential concerning their soluble fraction. Section 9 of Volume 2 of the Application defines how this will be carried out at the Installation for existing residues and disposal routes. Condition 3.5.1 requires the Applicant to analyse the bottom ash, APC residues and other solid residues before any new disposal or recycling routes are used. The Agency therefore considers that Article 9 is satisfied.

2.7 Article 10 - Control and monitoring

2.7.1 Article 10(1) and (2) require that measurement equipment and techniques shall be installed and used to monitor the incineration process, and that the measurement requirements shall be laid down in

Permits. These requirements are covered in condition 3.5.1, and schedule 4 tables s4.1 and s4.1(a), emissions to air, and table S4.4, process monitoring requirements which the Agency considers fulfil the WID requirements.

2.7.2 Article 10(3) requires CEM for emissions to air and water to be subjected to regular control, testing and calibration. These requirements are addressed in schedule 4 tables S4.1 and S4.1(a) (emissions to air), and table S4.4 (process monitoring requirements) requiring monitoring to be carried out in accordance with CEN, ISO, BS national, international methods or Agency guidance. Agency Monitoring Guidance Note M2 defines what is required in an annual surveillance test. Condition 3.5.3 requires all monitoring equipment, techniques, personnel and organisations employed for the emissions monitoring programme to have either MCERTS certification or MCERTS accreditation (as appropriate). Such certification or accreditation requires regular testing of CEM equipment to meet the requirements of Article 10(3).

2.7.3 Article 10(4) requires sampling points to be specified in Permits. Schedule 4 tables S4.1 and S4.1(a) (emissions to air), and table S4.4 (process monitoring requirements) address this issue.

2.7.4 Article 10(5) requires periodic measurements to air and water to comply with Annex III, points 1 and 2. The requirement in point 1, for measurements to be carried out representatively. Point 2 requires that measurement methods and calibration of CEMs must be to CEN standards, or ISO, international or national standards if CEN standards are not available. These requirements are addressed by condition 3.5.3, requiring the use of certified equipment and accredited personnel to be employed for all emissions monitoring. The Agency considers that the Permit therefore delivers all the relevant requirements of the WID in this respect.

2.8 Article 11 (except for Article 11(1) and 11(13)) – Measurement requirements

2.8.1 Article 11(2) sets out the air pollutant measurements that are required to be carried out, in accordance with Annex III. Continuous emissions monitoring of NOx, CO, total dust, TOC, HCl, and SO2 and periodic measurement of HF, heavy metals, dioxins and furans measurement requirements are delivered by condition 3.5.1 and schedule 4 tables S4.1 and S4.1(a) (emissions to air), and table S4.4 (process monitoring requirements). In addition, Article 11(2) requires the process parameters of: temperature at a representative point of the combustion chamber, concentration of O2, pressure, temperature and water content of the exhaust gases to be monitored. Condition 3.5.1 and schedule 4 table S4.4 (process monitoring requirements) deliver these monitoring requirements.

2.8.2 The requirements of Article 11(3), to verify the residence time and minimum temperature, is delivered by pre-operational condition PO01 in table S1.4.

2.8.3 Article 11(4) allows the continuous measurement of HF to be omitted in certain circumstances, which are satisfied for the facility. This measurement has been omitted for the Installation because the use of the acid gas abatement plant provides a high level of acid gas scrubbing, which will ensure that there are no exceedences of the HCl limit, and condition 3.1.2 requires the Applicant not to exceed the HCl limit. Condition 3.1.2 and schedule 4 table S4.1 requires the Operator to carry out periodic measurement of HF.

2.8.4 Article 11(6) provides the option of periodic measurement for HCl, HF and SO_2 instead of CEMs. CEMs are provided for HCl and SO2. Continuous monitoring of HF will be replaced by periodic monitoring as described in para 2.8.3 above.

2.8.5 Article 11(7) allows the competent authority to Permit a reduction in the monitoring frequency for heavy metals, dioxins and furans under certain conditions, provided the criteria in article 17 of WID are available. No such criteria have been set under article 17, hence no such reduction has been allowed in this Permit. Monitoring frequencies are specified by schedule 4 tables S4.1 and S4.1(a) (emissions to air), and table S4.4 (process monitoring requirements).

2.8.6 Article 11(8) sets out reference conditions for incineration. The specific reference conditions for the facility are contained within Schedule 7 of the Permit.

2.8.7 The recording and reporting requirements in Article 11(9) for measurements are delivered by Section 4 and Schedules 5 and 6 of the Permit.

2.8.8 Article 11(10) sets out the compliance criteria for ELVs in accordance with Annex V. These are delivered by conditions 3.1.2 and by schedule 4 tables S4.1 and S4.1(a) (emissions to air), and table S4.4 (process monitoring requirements) and by schedule 7 (which defines reference conditions).

2.8.9 Article 11(11) provides that, for incineration, daily average monitoring results from CEMs are to be generated from half-hourly averages, and that no more that 5 half-hourly averages can be discarded each day due to malfunction. In addition no more than 10 daily averages per year can be disregarded in this way. These requirements are contained within schedule 4 table S4.1, note 2.

2.8.10 Article 11(11) also requires that the half-hourly averages (used as above) are determined after subtracting the 95% confidence intervals

defined in Annex III. Schedule 4 table S4.1, note 2 contains this requirement.

2.8.11 Article 11(12) requires that periodic measurement conditions shall be laid down in accordance with Annex III. Annex III compliance has been referred to in paragraphs 2.8.1 and 2.8.10 of this Appendix.

2.8.12 Article 11(14) to (16) addresses the monitoring of wastewater from the cleaning of exhaust gases (see also Article 8 above). There are no such releases from the Installation.

Article 11(17) requires that where the measurements taken show that the ELVs for air and water laid down in the Directive have been exceeded, the Agency is informed without delay. Condition 4.3.1 of the Permit fulfils this requirement

2.8.13 The Agency therefore considers that the Permit complies with the applicable requirements of Article 11.

2.9 Article 12(2) - Access to information and public participation

2.9.1 Article 12(2) requires that, for plant with a normal capacity of two tonnes or more per hour, an annual report on plant operation and monitoring is also made available. Condition 4.2.2 of the Permit fulfils this requirement by requiring an annual report which will be placed on the public register.

2.10 Article 13 - Abnormal operating conditions

2.10.1 Article 13(1) requires conditions to be included in Permits laying down the maximum period of technically unavoidable stoppages, disturbances or failures of purification or measurement devices, during which discharges to air and water may exceed the ELVs. Conditions 2.3.6 to 2.3.9 put a limit on such periods of abnormal operation. The combined effect of Articles 6(3) and 11(2) is to require operational continuous monitoring at all times. However, Article 13(1) provides for some operational flexibility in practice. The Environment Agency considers that the maximum period of technically unavoidable stoppages, due to disturbances or failures of measurement devices should be limited, to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year. These periods are additional to those allowed under the 95% availability requirements of the CEN monitoring standards that are required to be included in the Permit under paragraph 2 of Annex III to the Directive. Available techniques for compliance with these Article 13(1) requirements include the installation of supplementary monitoring, or having appropriately-trained personnel to maintain the monitoring equipment available. The combined effect of these conditions is to ensure that the installation has reasonable operational

flexibility in terms of time to repair faulty equipment, but cannot operate indefinitely in such circumstances.

2.10.2 Article 13(2) requires the Applicant to cease the feed of waste in the event of a breakdown. This requirement is contained within condition 2.3.10

2.10.3 Article 13(3) limits abnormal operation, when ELVs are exceeded (for any reason) when using wastes as fuel, up to 4 hours uninterrupted duration. It also imposes a maximum cumulative limit on periods of abnormal operation when using wastes as fuel, of 60 hours per year. These requirements are delivered by condition 2.3.10.

3. Conclusion

The Agency has carefully considered the applicable requirements of the WID specified in Schedule 13, and is satisfied that the Permit ensures that these will be complied with.

ANNEX 2 Improvement conditions

Ref No	Improvement Condition	Justification
IC1	The operator shall submit a written summary report to the Agency to confirm by the results of calibration and verification testing whether the performance of Continuous Emission Monitors for parameters as specified in Table S4.1 and Table S4.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	This is necessary to confirm that the CEMs meet the requirements of the WID. If it does not the plant will not be allowed to operate.
IC2	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 Agency	Required to demonstrate compliance with the WID of the plant as installed.
IC3	The operator shall submit a post-commissioning report to the Agency which shall include: • a review of performance of the facility against the conditions of this permit. • details of optimization of emission abatement systems including reagent dosing rates. • details of procedures developed during commissioning for achieving and demonstrating satisfactory process control.	We are satisfied that the operator's proposals represent BAT. However, this condition is necessary to demonstrate that following the completion of commissioning, the emissions abatement systems have been optimised and that the relevant requirements of the WID are achieved.
IC4	The operator shall submit a written proposal to the Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1, identifying the fractions within the PM_{10}, $PM_{2.5}$ and $PM_{1.0}$ ranges. The proposal shall include a timetable for approval by the Agency to carry out such tests and produce a report on the results. On receipt of written agreement by the Agency to the proposal and the timetable, the operator shall carry out the tests and submit to the Agency a report on the results.	Emissions of particulate matter have been considered in section C7.3.1 Current air quality legislation contain proposals for the introduction of an additional ambient air quality standard which is $PM_{2.5}$. A true assessment of ground level impacts from $PM_{2.5}$ and PM_{10} emitted from the incinerator stack can only be undertaken given an understanding of the amount of each fraction released.
IC5	The Operator shall carry out an assessment of the impact of emissions to air of Chromium (VI) having regard to the 2009 report of the Expert Panel on Air Quality Standards – Guidelines for Metal and Metalloids in Ambient Air for the Protection of Human Health. The assessment shall predict the impact of Arsenic and Chromium (VI) against the guidelines through the use of emissions monitoring data during the first year	To demonstrate whether emissions of Chromium (VI) are within the EPAQS air quality guidelines.

Ref No	Improvement Condition	Justification
	of operation and air dispersion modelling. A report on the assessment shall be made to the Environment Agency.	

ANNEX 3 : Pre-Operational Conditions

Ref No	Pre-Operational Condition	Justification
PO01	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. The report shall also justify the position of all temperature probes that are to be used to demonstrate compliance with WID requirements and demonstrate the design reliability and accuracy of the temperature probes. Operations at the site shall not start until the report is approved in writing by the Agency.	Applicant has stated that furnace will comply with these requirements, but this needs to be confirmed at the completion of the design phase. If it is not confirmed it will not be allowed to operate
PO02	The operator shall submit a written report to the Agency specifying arrangements for continuous and periodic monitoring of emissions to air to comply with all relevant guidance, including Technical Guidance Notes M1 and M2, and the SGN. The report shall include the following: plant and equipment details, including accreditation to MCERTS methods and standards for sampling and analysis of all substances controlled by the Waste Incineration Directive plus continuous monitoring of N_2O and NH_3 monitoring locations, access and working platforms	The application provides acceptable information about monitoring methods and standards for substances specified by the WID. The report shall provide details of the specific instrument, its accreditation and the way in which it will be installed. It is Agency policy, and indicative BAT, that where abatement is relied upon to prevent an adverse environmental impact continuous monitoring or equivalent technical measures are required. The location of sampling points is crucial to obtaining representative results, and shall be checked by the Agency.
PO03	The Operator shall submit a written commissioning plan to the Agency along with timescales for implementation. The plan shall be designed to demonstrate that permit conditions will be met under all anticipated operating conditions and shall confirm the commissioning programme and plant monitoring protocols. The plan shall be implemented in accordance with the Agency's written approval and commissioning shall not commence until that approval is provided.	Commissioning trials are required for the operator to demonstrate that his process is under control and that his emissions reliably meet the requirements of the WID.
PO04	The operator shall submit a written plan to the Agency for approval detailing the ash sampling protocol to be used for APC residues and bottom ash, in conformance to Agency Guidance. The plan shall be implemented in accordance with the Agency's	The ash sampling protocol can have a major effect on the results measured. Indicative BAT requires

Ref No	Pre-Operational Condition	Justification
	written approval.	the protocol to be approved by the Agency.
PO05	The Operator shall submit a copy of the site Environment Management System (EMS) to the Agency and make available for inspection all documents and procedures which form part of the EMS. The EMS shall be developed in line with Part 1 of 'How to comply with your Environmental Permit (EPR1.00)', Horizontal Guidance Note H6 'Environmental Management Systems' and the additional requirements set out in Section 1 of 'The Incineration of waste (EPR 5.01)' guidance document. The Operator shall also submit a plan, with timescales that identifies when external certification for the site EMS will be obtained.	To ensure that the Operator has a suitable Environmental Management System in place prior to start of operations at the site i.e. prior to any waste or raw material being received on site, and that such an EMS is in line with Agency guidance and suitable to gaining external certification.
PO06	The operator shall provide the Agency with a written report for approval describing the detailed programme of noise monitoring that will be carried out at the site at the commissioning stage and also when the plant is fully operational. The report shall include confirmation of locations, time, frequency and methods of noise monitoring, and identify the noise monitoring survey reports that will subsequently be provided to the Agency. The monitoring programme shall be carried out in accordance with the Agency's written approval.	A programme of noise monitoring at the installation boundary is required once the site is operational to verify the results of the noise impact assessment in the application, identify any unpredicted issues during commissioning and produce a reference point for ongoing operations.
PO07	The operator shall submit a written report to the Agency for approval that includes a detailed site drainage plan and the specific design detail of the containment infrastructure at the site, including all sub-surface structures and equipment. The report shall also include an inspection and maintenance programme for the containment infrastructure and equipment at the site.	At the time of submission of the application a detailed site drainage plan and details of the as-installed site infrastructure were not available. This report will verify that proposed drainage and containment infrastructure have been satisfactorily installed and that the Operator has an adequate maintenance and inspection process in place prior to the commencement of operational materials arriving on site.
PO08	The Operator shall submit a written report to the Agency detailing the waste acceptance procedure to be used at the site. The waste acceptance procedure shall include the process and systems by which wastes unsuitable for incineration at the site will be controlled. The procedure shall be implemented in accordance with the written approval from the Agency.	Additional conditions of waste acceptability have been incorporated through Table S3.2. This condition requires the operator to develop a procedure so that compliance with these conditions can be practically implemented during ongoing operation of the installation.

Annex 4

Comments on the Application from the Public

This section contains a summary of responses to advertising the application and the way in which we have taken these into account in the determination process:

Brief Summary of comments	Agency response
Public Surgery event held 15/06/09.	
A total of 21 people recorded their attendance at this event. Five of these attendees recorded comments on the 'response proformas' provided, and these comments are summarised below.	
1. Will future scientific learning be built into permit?	Yes, EPR permits are living documents and they can be varied during their life as new information or technology becomes available. In addition some legislation requires that scientific improvements are implemented as soon as available e.g. the WID requires that continuous monitoring of certain metals and dioxins is put in place as soon as appropriate technology becomes available.
2. Don't know full potential impact, therefore should not be located in a built up area.	Review of the Air Quality Assessment and Human Health Risk Assessment provided with and supplied in support of the Application is recorded in Sections C7.2 and C7.3 of this document.
3. Health issues in respect to kids in local schools	
4. Local allotments and air deposition.	
5. Health issues – asthma in local kids is higher than normal, also dermatitis.	
6. Will the waste flows to match the capacity of the new plant actually materialise.	The issue of whether or not there is a need for the proposed facility has been considered by the planning authority. The environmental permitting regime does not require an applicant to demonstrate need . We have had regard to the objectives of the Waste Framework Directive - see section D1.2 of this document.
7. May be seen as a reason not to recycle materials.	Schedule 3 of the permit specifically excludes the incineration of wastes that could feasibly be recycled / recovered.
8. Autoclave technology – how could that be utilised?	The EA support autoclave technology which involves the sterilisation of waste by high pressure steam prior to segregation, in cases where the sterilisation of the waste stream is necessary e.g. potentially infectious clinical waste. Where such sterilisation is not required the energy consumption of the sterilisation process is not justified. Although

Brief Summary of comments	Agency response
	segregation of output wastes post autoclaving can result in cleaner recyclable materials, this can also be achieved by source segregation of waste at source. The residual floc (which is the largest fraction of the output from an autoclave process) will have a high water content, and may need to be pre-dried prior to any subsequent practical re-use. No energy is created or released directly from the autoclave process.
9. Road traffic issues if Rover Way is closed. 10. Concerns regarding additional traffic load on Moorland Road.	Traffic volumes are a matter for the planning authority. Within the assessment of an application for an EPR permit we are concerned with the impact of the operation the installation.
11. Celsa dust issues – tipping at back of Bunt's Scrapyard has resulted in residual contamination.	Issues with other unconnected sites in the area are not a factor that is appropriate to consider as part of the determination of the Environmental Permit for this site. The operational techniques described in the Application and now incorporated through Conditions in the Permit require that all wastes produced from the process are stored in appropriate contained areas within the building or in dedicated contained storage silos. The wastes will then be removed from the site by secured transport vehicles for off-site recovery or disposal. Failure to adhere to the conditions of the permit will result in enforcement action being taken against the site.
12. Could capture energy from steelworks.	Other than the minimal use of auxiliary fuel during start up and shut down periods, the process is a net producer of electrical and heat energy. Therefore it is very unlikely that any waste energy from the steelworks could be utilised in the process.
13. Concern of mixing metals and plastics at high temperatures – could magnets be used prior to incineration?	The domestic municipal waste accepted at the site will be segregated at source to minimise plastics and metals content. The operator is required by the conditions in their permit to ensure that emissions are such as to adequately protect the local environment and human health.
14. Existing smell from sewage works, steelworks and natural gas storage.	Conditions within the permit will ensure that odour resulting from the EfW installation will be minimised and will not cause pollution beyond the boundary of the site. We are satisfied that the operation of the site, as described within the application, will minimise odour nuisance. In particular (i) waste accepted at the installation will be delivered in covered vehicles or within containers, (ii) bulk storage of waste will only occur in the installation's waste bunker,(iii) roller shutter doors will be used to close the entrance to the tipping hall outside of the waste delivery periods and (iv) combustion air will be drawn from above the waste storage bunker for use within the incinerator in order to prevent odours and airborne particulates from escaping from the facility building .

Brief Summary of comments	Agency response
15. Concern regarding where the Bottom Ash will go – is there a market? Need to check toxicity of Bottom Ash.	Most Incinerator Bottom Ash (IBA) is likely to be non-hazardous waste. IBA is classified on the List of Wastes as a 'mirror entry'. This means that IBA must be assessed, and if found to possess any one of the fourteen hazardous properties (which include eco-toxicity) it would then be classified as a hazardous waste. A pre-operational condition has been included in the permit requiring the operator to propose an ash sampling protocol. The bottom ash can be relatively inert as the combustion process will burn off most of the carbon and volatile components contained in the treated waste. However, this does not mean that bottom ash is considered to be an inert waste for the purposes of waste classification and disposal. If the operator wished to classify and dispose of the bottom ash as an inert waste they would need to demonstrate that the waste satisfies the Waste Acceptance Criteria (WAC) for inert waste. Alternatives to landfilling of bottom ash exist, and this ash can be used, for example, in road construction as an aggregate, or in the manufacture of concrete products.
16. Please make 'CHP ready' a design requirement even if no market for CHP at time of commissioning.	The Applicant has undertaken a detailed survey of potential heat users within practical proximity of the proposed installation site. This is recorded as the 'Heat Plan' in Section 9 of the Application. Even if local heat consumers are not committed at the commencement of operation of the installation, conditions in the permit require that a system of 'pass-out' valves are maintained within the design of the steam cycle equipment. Further conditions in the permit require that the Operator keeps opportunities for external heat utilisation under regular review and that these reviews are reported to the Agency. This will ensure that any feasible opportunities for the export of steam from the site are realised.
Public Surgery event held 06/07/09.	
A total of five people recorded their attendance at this event. No comments were recorded or submitted on the 'response proformas' provided.	
'**Public Interest Consultants' (acting on behalf of Friends of the Earth Cymru).**	
Issues relating to the application of the Persistent Organic Pollutants Regulations 2007 (the POPs Regs) in application assessment and determination of the application.	The way we have considered BAT and the application of the Persistent Organic Pollutants Regulations 2007 in determination of this Application is recorded at Section C7.1.2.7 of this document.

Brief Summary of comments	Agency response
Friends of the Earth Cardiff	
1. Concerns regarding the large quantities of toxic fly ash that will be produced and which will require disposal at a hazardous landfill site in Gloucestershire.	The location of the plant determines the proximity of suitable disposal facilities for the fly ash and APC system residues. The location of the plant is a planning consideration. Air Pollution Control (APC) residues or fly ash are classified as a hazardous waste (not inert) and must be disposed of at a suitable hazardous waste treatment/disposal facility. It is the responsibility of the producer to ensure that such hazardous waste is disposed of in accordance with current environmental legislation.
2. Concerns regarding the waste classification status of the Bottom Ash that will be produced by the process and how that will impact on subsequent recovery or disposal treatment of this material.	Pre-operational condition PO04 will ensure that the Operator has an appropriate ash sampling protocol in place prior to start up of the installation. This will enable the Operator to determine the waste classification of the bottom ash produced. The waste classification will determine which disposal and / or treatment options are available for the bottom ash. It is the responsibility of the producer to ensure that waste only goes to facilities that are permitted to accept them (based on waste classification and EWC) for disposal / treatment. Any failure will be addressed in accordance with the Agency's Enforcement and Prosecution Policy. The operator will carry out a considerable amount of self monitoring (as specified in Table S4.5 of the permit) using quality assured procedures which are subject to scrutiny and audit by the Agency. We are satisfied that the operator has the necessary competence to undertake this work.
3. Does the Environment Agency believe that Viridor has sufficiently surveyed the existing levels of the AQ Standards Regulations Wales 2007, Group A and B pollutants in the area, including lead and metals? Has it modelled these together with those emitted from the proposed incinerator for the purpose of the EIA Regulations 1999, Reg 6?	We believe that the Applicant has produced a comprehensive review of existing National and European Air Quality Standards and Objectives. These are recorded in Section 2 of Appendix 7 of Section 10 of the Application. However, 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", proposes 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. These more recent guidelines were not considered by the applicant in the submitted application as they were not published at that time. However, the Agency has undertaken an impact assessment against these recent guidelines using the modelling data provided in the application. This assessment is recorded in Section C7.3.1 of this document.

Brief Summary of comments	Agency response
4. Viridor does not provide information on potential pollutants from the burning of the commercial and industrial wastes they propose. The EA should decide if the information on potential air pollutants in Viridors Environmental Statement falls short of required information under EIA Regulations 1999, Reg 2(1).	Each waste listed in the Application has been reviewed by considering factors such as: - whether the waste is generally similar to the constituents of mixed municipal waste; - whether it is likely to be in the design CV range for the plant; - whether it is likely to contain toxic contaminants and the likely fate of these in the incineration process; and - Whether there are any particular operational issues likely to arise from burning of the waste. As a result of this review some of the waste categories requested in the Application have not been authorised for acceptance at this site. The list of acceptable wastes is included in Schedule 3 of the permit. Given the operational controls described in the application for waste receipt, mixing and input to the furnace and the flue gas abatement methods proposed for the plant, we believe that the pollutants modelled and recorded in the Air Quality Assessment of the Application do reflect the potential emissions from the process. These pollutant levels are reflected within the emission limit values set on the Permit.
5. Viridor state in their AQ Assessment that emissions from the Celsa steelworks are released over 1km from the proposed development. Whilst this is true for the Celsa Tremorfa site, they also have a much smaller site at East Moors which is only 400m from the proposed development. The EA should check that these emissions have been included in the modelling assessment.	The Air Quality Assessment provided in the Application includes consideration of a number of data sources of existing ambient air pollutant background values. The applicant has also initiated their own study of existing background measurements for nitrogen dioxide and other pollutants at locations near to the proposed site. We are therefore satisfied that other existing local emission sources have been considered in the assessment, as part of the recorded existing ambient background concentrations.
6. The Viridor AQ Assessment also states that 'wet deposition' occurs via the incorporation of the pollutant into water droplets which are then removed in in rain or snow, and is not considered significant over short distances - compared to dry deposition and therefore for the purposes of this assessment , wet deposition has not been considered. This ignores the high rainfall in the Cardiff area which should be a material consideration.	This extract is taken from the section of the AQ Assessment that relates to the assessment of impact on ecosystems, and refers to the modelling treatment of deposition from gas phase pollutants. This approach is appropriate for the consideration of deposition impact from gas phase pollutants on ecosystems. It is consistent with guidance provided in AQTAG 06, which was developed by the Environment Agency and the Conservation Agencies. The application AQ Assessment does record that wet deposition effects have been considered in the deposition modelling of metals and dioxins which are primarily derived from particulate emissions. The AERMOD dispersion modelling study provided with the application has been reviewed by AQMAU, and it has been confirmed that wet deposition effects are

Brief Summary of comments	Agency response
	included in the assessment of deposition of metals and dioxins.
7. The application states that the assumed 'worst case scenario' is for the incinerator to be in continuous operation throughout the year and for pollutant emission rates to be at the daily average permitted WID limits continuously through out this period. However this ignores the significantly higher emission levels that occur during start-up and shut-down. The operational predictions suggest that the incinerator will start-up and shut-down at least twice per year.	The emission control and abatement systems must be in operation during start-up and shutdown periods – otherwise they would need to be monitored and recorded as periods of 'abnormal operation'. With the abatement systems in continuous operation during these periods, it is unlikely that there will be any extended periods during start-up/shutdown when emissions will be significantly above the limits set in the permit. We have undertaken an impact assessment for periods of 'abnormal operation' (which are allowed in the WID to occur for up to 4 hours at time), assuming that 'abnormal operation' could include a total failure of abatement systems for the duration of the 4 hour period. This assessment is recorded in Section C7.3.4.2 of this document. From this assessment, we have concluded that the process contribution of most pollutant materials can still be considered as insignificant when with the relevant short term EQS/EAL values. And that during such periods of 'abnormal operation', non of the emitted pollutants is likely to give rise to a breach of any EQS/EAL.
8. Issues relating to press reports on management practice deficiencies at an incinerator site in Bolton that was operated by another company but which has now been taken over by Viridor.	It is understood that the referenced incidents at this site took place when the site was owned and under the management control of another operator. Viridor do have existing experience in operating incinerator plants in other parts of the UK. We are satisfied with the proposed framework of their management system described in the application, and with their commitment to achieve external certification of the developed system once the plant is operational. Additionally, pre-operational condition PO05 requires the operator to submit a copy of their developed plan to the Agency for assessment at least three months prior to the start of commissioning.
9. The assertion in the application that actual long term (annual) emissions (and resultant impacts) are likely to be between 5.7% and 8.6% lower than modelled for this assessment is incorrect because it does not take into account the effects of re-starts and shut-downs for maintenance.	The stated relative reduction percentages relate to the Applicants consideration of dispersion model sensitivity in the context of expected annual operational hours. Periods of start-up and shutdown when emission levels might be above the normal emission limit values are likely to be only a very small percentage of the total hours in a year (8760), on which the modelling study is based. Long term impact assessment values are not therefore likely to be influenced by any change in release rates during start-up or shutdown, in particular as the operational hours for the plant are will typically be around 8000 hours per year. See response to Q7 above for consideration of short term impacts during start-up/shutdown.
10. The data in Table 5.2 of the application AQ Assessment is potentially misleading in that the emission rates recorded are given 'per line'. As the	We have analysed the data presented in the Air Quality Assessment Report that was provided in the Application, this included assessment of the model

Brief Summary of comments	Agency response
incinerator has two lines the data in this table should be doubled.	input files that were used in the dispersion modelling study. We are satisfied that the dispersion modelling study and the resultant Air Quality Assessment Report reflects the total emissions from the installation (both lines).
11. A number of existing tall buildings do not appear in drawing AQ5 which supports the AQ Assessment in the application. Please check how the existence of these extra buildings would affect the modelling of emissions.	The meteorological data used in the impact assessment (air dispersion modelling) was assessed by AQMAU as being representative of the area and acceptable for use. 5 years of meteorological data was used to ensure that a wide range of meteorological/atmospheric conditions were included in the dispersion modelling, which would include different wind speeds, wind directions and particular conditions such as temperature inversions. The applicant also conducted a sensitivity analysis of the dispersion modelling study, which included an analysis of variables associated with model parameters. These included coastal effects, surface roughness within the meteorological data, terrain effects and site buildings effects. This analysis concluded that there was a low sensitivity to model inputs (less than 1%), in predicted long and short term impacts. We are therefore satisfied that the modelling study provides a representative basis for the impact assessments.
12. The Human Health Review document submitted by Viridor states that the objective of the assessment is to evaluate the potential risk for populations that may be exposed to emissions from the proposed EfW facility. However the study does not appear to take account of the existing steelworks or docks area. We are concerned that the pollution from the incinerator alone may be within WHO guidelines, but it should be checked that this is still the case when the emissions from the steelworks and the docks area are also considered together with the EfW emissions.	The Human Health Risk Assessment included with the original application was reviewed and considered to be unsuitable, in that it was based on the CLEA model for deposition impacts and did not take account of uptake routes for all potential pollutants.. A more comprehensive assessment was requested and subsequently provided by the Applicant. This assessment utilised US-EPA methodology, and was assessed by AQMAU against our own assessment study. This confirmed that the conclusions recorded in the re-submitted assessment were reasonable and that predicted uptake of pollutant materials will be below the recommended limits. As recorded in the response to Q5 above, the AQ Assessment records consideration of a number of sources of background air quality data. AQMAU have confirmed that the data sources used in the AQ Assessment are appropriate.
The remainder of the issues recorded in this response made reference to matters such as incinerator capacity, planning policy, the waste hierarchy, the proximity principle and associated issues.	These are matters outside the scope of the EPR Application process, and are more appropriate for consideration by the local planning authority when assessing the Planning Application for development at the site.
Respondent on behalf of Rumney Community Development Association *(Letter dated 15/06/09 addressed to the CEO of the Environment Agency Wales and headed 'I wish to object to the Planning Application for the*	

Brief Summary of comments	Agency response
following reasons:'	
1. The incineration process will produce toxic waste.	We have reviewed the anticipated wastes that are likely to be produced by the facility and are satisfied that these will be minimised through the operating techniques described in the application. We are also satisfied that the wastes that are produced as a result of the process will be suitably handled and sent for appropriate recovery or disposal in accordance with current legislation.
2. Viridors lack of real experience in operating this type of plant raises safety concerns	Viridor do have existing experience in operating incinerator plants in other parts of the UK. We are satisfied with the proposed framework of their management system described in the application, and with their commitment to achieve external certification of the developed system once the plant is operational. Additionally, pre-operational condition PO05 requires the operator to submit a copy of their developed plan to the Agency at least three months prior to the start of commissioning.
3. It will badly affect the people who live and work in the surrounding areas of Cardiff and its stack emissions have the potential to travel over 100 miles.	We have reviewed the Air Quality Assessment provided in the application and the re-submitted HHRA provided by the applicant. These assessments have also been audited by AQMAU and we are therefore satisfied that they have used appropriate methodology and that the conclusions presented in the reports represent a reasonable assessment of the predicted emissions from the facility and their potential impact on human health. These assessments conclude that there will be no significant risk to health caused by operation of the plant. We have also reviewed the wastes that can be accepted for processing at the facility and the emission control and abatement systems that will be included in its design, and are satisfied that the emission limits contained within the permit can be achieved.
4. It will also affect the health and environment of the people who live on the routes used to transport the waste and remove the toxic fly ash.	
5. Incinerators can produce health damaging emissions, such as PM2.5, Dioxins and furans. These toxic compounds have no known safe level of emission. They burn plastics. Plastics have a lot of energy, yet some plastics contain lead, chlorine, cadmium, and other heavy metals. When these are burned, they form compounds that then have to be scrubbed from the air.	
6. Garbage is **"wet".** When delivered to processing. Burning wet materials tends to lead to cold spots in combustion, and incomplete combustion, unless other fuels are added. Thus reducing temperatures and creating heavy metal emissions.	We have reviewed the wastes that can be accepted for processing including their expected composition, characteristics and calorific value. The proposed incinerator technology is a conventional moving grate design, which has well proven capability to safely and efficiently handle the range of municipal and commercial/industrial wastes that are approved for treatment in the permit. There are safeguards within the design of the plant to ensure that waste is not burnt should the temperature reduce below the minimum required by the Waste Incineration Directive. The mixed domestic waste is largely source segregated to remove metals and glass. The waste permitted to be burnt does not include glass or metal streams. The incinerator will be designed and constructed from materials
7. There is no calorific value in burning glass, metals or cardboard and these materials have an adverse affect on the maintenance requirements of the incinerator furnace.	

Brief Summary of comments	Agency response
	that are suitable to deal with the wastes that are to be burnt at the site.
8. During the summer there will be smells emitted from the site.	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. Combustion air will be drawn from above the waste storage bunker in order to prevent odours and airborne particulates from escaping from the facility building.
9. There will be a high carbon footprint resulting from the expected extra 260 waste lorries travelling to and from the site. The waste disposal options should be located near a rail head for future development. Incinerator establishments often blight the property values in residential areas, as the get flagged up as an environmental issue on house sales.	These issues are outside the scope of the Environmental Permitting Regulations, and are essentially issues for consideration by the Local Planning Authority when assessing planning application for development.
10. It may influence businesses not to locate to the local area and some existing businesses may decide to move away as a result of its existence.	
11. It is also a waste of valuable commercial land that could be used to attract far better business to the city. The chimney stacks of incinerators tend to be high and would look unsightly for the city skyline.	

Annex 5

Consultee Responses received from Public Bodies

This section contains a summary of responses to consultation on the application and the way in which we have taken these into account in the determination process:

Brief Summary of comments	*Agency response*
Cardiff Local Health Board	

Brief Summary of comments	***Agency response***
1. Fugitive dust emissions are likely and it is important that these are adequately controlled so that they do not adversely impact on human health	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. Combustion air will be drawn from above the waste storage bunker in order to prevent odours and airborne particulates from escaping from the facility building. Ash residues will be collated and stored within dedicated areas or silos within the building, prior to subsequent transfer to covered or sealed tanker vehicles for removal from the site. We are therefore satisfied that appropriate design and operational techniques will be ensured at the facility to prevent or minimise the potential for odour or dust release
2. There is the potential for odorous emissions to atmosphere. Given the perceived association between odour and ill health, it is vital that such operations are managed to the highest standards, so as not to provoke community concerns.	
3. It is therefore recommended that once the plant is operational that actual emission data is used to confirm predicted emissions.	Improvement Condition IC3 in the permit requires the operator to provide a post commissioning report that has to include a review of the performance of the plant against the conditions and limits of the permit.
4. A timetable should be agreed with the Regulator in seeking certification for its EMS.	Pre-operational Condition PO05 requires the operator to submit a copy of their EMS to the Agency prior to commencement of commissioning. This condition also requires them to provide a plan with timescales for the external certification of the EMS.
5. Once operational a new noise survey should be carried out to demonstrate that noise emanating from the site will not adversely impact on human health.	Pre-operational Condition PO06 requires the operator to provide a detailed programme for noise monitoring at the site, which will include the requirement for surveys at the commissioning stage and when the plant is fully operational.
6. The filtration systems should be inspected regularly and maintained in accordance with the manufacturer's recommendations.	We are satisfied from information in the application and the maintenance programme that will be included as part of the site EMS, that appropriate monitoring and maintenance procedures will be undertaken for the bag filter plant and other operational equipment.
7. The applicant should ensure that there will be no perceived odour detected outside the installation boundary. The applicant is required to show proof to the Regulator that BAT will be employed for odour abatement.	We have reviewed the plant design and operational techniques described in the application, and compared these with the BAT control measures described in The Environment Agency's Incineration of Waste sector guidance document EPR S5.01, and consider that appropriate odour control measures will be utilised at the facility.
Food Standards Agency (FSA)	
Brief Summary of comments	***Agency response***
The main potential risks to food safety would arise from the deposition of airborne pollutants and from the inappropriate handling and disposal of fly ash from the process. There do not appear to be any significant food	We have reviewed the AQ Assessment provided in the application and the re-submitted HHRA provided by the applicant, which considers the deposition of airborne pollutants to ground. AQMAU have also audited

Brief Summary of comments	***Agency response***
chain receptors in the vicinity of the proposed operation. The conclusion of the Human Health Risk Assessment is noted, and appears to be based on reasonable assumptions. Provided the operator complies with the provisions of Sector Guidance Note IPPC S5.01, it is unlikely that there will be any unacceptable effects on the safety of the food chain.	these reports and their conclusions and we are satisfied that there will be no significant human health risks resulting from the proposed plant emissions. The equipment and procedures proposed for the storage and handling of APC residues has also been reviewed, and we are satisfied that the arrangements will be sufficient to prevent or minimise any release of these residues.
Countryside Council for Wales (CCW)	
Brief Summary of comments	***Agency response***
Providing the proposals are carried out in the manner and location specified, the Countryside Council for Wales does not object to the application.	The potential impact on relevant nearby habitat sites is recorded at section 7.3.3 of this document. A detailed Appendix 11 assessment was prepared and submitted to CCW for review. CCW subsequently confirmed their agreement with the conclusions recorded in the assessment.
Cardiff County Council (Environmental Health Department)	
Brief Summary of comments	***Agency response***
No response received	
Cardiff County Council (Planning Department)	
Brief Summary of comments	***Agency response***
No response received	
Health and Safety Executive (HSE)	
Brief Summary of comments	***Agency response***
No response received	
Welsh Water	
Brief Summary of comments	***Agency response***
No response received	

Annex 6

Consultation on the Draft Decision

This section records the outcome of the public consultation on the draft decision that was carried out between 26 July 2010 and 10 September 2010. Our normal 20 working day period for this stage of public consultation was initially extended to 01 September 2010, given that the consultation was started in the annual holiday season. In response to comments from local councillors and other local residents, we extended the consultation period by a further 10 days to accommodate input from local schools returning from their summer holiday break. We also acknowledged and continued to give consideration to responses that were received in a period after the stated closure date for responses.

A public information session was held at the STAR Centre in Splott on 30 July 2010, this included reservable one to one sessions, and less formal access to members of our staff so that our decision making process could be further explained. Over 120 people attended the event, and they were provided with feedback sheets to help facilitate the recording and collation of comments on our draft decision.

We received over 100 comments in response to this stage of consultation, including those submitted by attendees at the STAR Centre information session described above. A significant number of the issues raised in the submitted responses are duplicated in the comments from several respondents, and these are not repeated in the summary below. Some respondents submitted more than one response comment during the consultation period.

We also undertook further consultation with Cardiff and Vale University Health Board and Cardiff Council during this period, in response to some of the issues that were raised by consultation respondents.

The tables below summarise the additional consultation undertaken, and the issues raised in response to this consultation.

Additional consultation undertaken with Public Bodies

Cardiff and Vale University Health Board	
Summary of additional consultation request	Consultee Response
Several respondents questioned the validity and reliability of the conclusions that had been drawn in recent HPA Position Statements and DEFRA Reports, which are recorded in the 'Review of existing guidance and reports' section of this document. Particularly, attention was drawn to the existence of a recent paper by Porta et al (published December 2009). In view of these comments, we asked Cardiff and Vale University Health Board if they wished to review the advice they had previously provided us with, in their consultation response provided at the initial permit application stage.	Cardiff and Vale University Health Board (LHB) sought further advice from Public Health Wales (PHW) and the Health Protection Agency (HPA) on this issue. The HPA undertook a detailed review of existing literature including the highlighted Porta et al paper. The HPA subsequently produced a report of their review which concluded - 'You can, of course, argue that the results from some of the studies on older incinerators indicate a need for caution. However, in view of the much lower levels of emissions from modern incinerators, the HPA confirms its view that, although it is possible that such small additions to the environment could have an impact on health, it is likely that any effects would be very small.' The LHB confirmed that they accept the content and conclusions recorded in the HPA review report. The LHB also made a recommendation in their response, that a local community health impact assessment (HIA) report should be taken into account in our final determination. (This recommendation is addressed at Ref. 8 in the following table of responses to comments from the public).
Cardiff Council	

Summary of consultation request	Consultee Response
Several respondents questioned the status and our assessment of impact on Air Quality Management Areas (AQMA) within the city of Cardiff area, particularly the Stephenson Court area on Newport Road. We therefore asked Cardiff Council to confirm the current status of the AQMA's that they have responsibility for within the city. We also provided copies of our consultation draft permit documents at this stage, and asked if they wished to make any comment or input regarding our 'minded to' decision.	Cardiff Council confirmed that the Newport Road and Philog AQMA's were revoked on 01 February 2007, and there are currently no plans to re-declare either of these areas. They also confirmed that the consultation process regarding the declaration of an AQMA for the Stephenson Court area had now been completed, and that in the absence of any subsequent objections from statutory consultees, the AQMA would come into force once an Order had been drafted and approved by the council's Chief Legal Services Officer. The declared AQMA will be for the annual mean concentration value of Nitrogen Dioxide resulting from the road traffic in this localised area of Newport Road. (Our assessment of the potential impact on this new AQMA is addressed at Ref. 7 in the following table of consultee responses).

Representations from members of the public and their representatives.

Ref.	Brief summary of issues raised	Summary of actions taken or show how this has been covered
1	Concern was raised about increased occurrence of cancer and the emission of nano-particles. Concerned that the emissions will effect the whole of Cardiff.	Risk to human health including risk of cancer is addressed in C7.3.2. Consideration of the impact of nano-particles is recorded in section 7.3.1 of this document. This references studies and the section of the September 2009 HPA statement which considers the health impact effect of particulates. The HPA report identifies 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 also note that in a sample collected in a day at a typical urban area the proportion of $PM_{0.1}$ (nanoparticles) is around 5-10% of PM_{10}. The dispersion modelling study identifies that the predicted maximum ground level concentration of total particulate resulting from the incinerator operation will be 0.05 $\mu g/m^3$, (which is 0.13% of the long term EQS for PM_{10}). Any ground level concentration of nano-particles ($PM_{0.1}$) is therefore expected to be extremely small. As a result of comments submitted during this public consultation, we undertook additional further consultation with Cardiff and Vale University Health Board, and they have confirmed that the HPA have not changed their conclusion that although it is possible that such small additions to the environment from modern incinerators could have an impact on health, it is likely that any effects would be very small.
2	The incinerator will undermine recycling initiatives by virtue of its high demand for waste to make it a viable business. The plants capacity to handle up to 350,000 tonnes of waste every year means that a significant proportion of waste from local authorities across South Wales will be burned at the Viridor site. A study from Denmark, along with experiences from local authorities in the UK, has borne this point out by showing that regions with higher incineration invariably have lower recycling.	Waste planning is primarily the responsibility of the waste Disposal Authority and the local authority. We have assessed the EPR application proposal against alternative thermal treatment technologies, emissions from the installation and the impact of those emissions. In so far as strategies for waste reduction and recycling are relevant, we have considered these in D1.2.

Ref.	Brief summary of issues raised	Summary of actions taken or show how this has been covered
3	The amount of greenhouse gases and dioxins emitted will increase and will be detrimental to efforts to reduce the carbon footprint here in Wales. A study of another UK incinerator in 2005 found the level of dioxins released was more than 900% of their authorised amount. Without the technology to utilise the excess waste heat from the plant, there will be very little in the way of environmental mitigation.	We are satisfied that any dioxin release from this incinerator will be minimised and controlled within the specified limit through control of the waste inputs, suitable design of the combustor and boiler plant flue gas stream parameters and the activated carbon injection abatement system. (See also Ref. 28 below). The combustion of waste will result in emissions to atmosphere of carbon dioxide. The amount of CO_2 released will be determined and dominated by the amount of waste burned and the carbon content of that waste. These parameters will be constant whatever the technology chosen for waste disposal. The key questions in terms of minimising global warming potential, are therefore the efficient generation and use of energy at the facility and minimising emissions of N_2O (a potent greenhouse gas) in the abatement of NO_x. These questions are addressed in the main body of this document and as part of the BAT assessment. In addition, generation of energy from burning waste means that fossil fuels will not be burned to generate that same amount of electrical energy elsewhere, thereby contributing to a lower net release of climate change gases given that the waste will also have a biogenic carbon content. If viable consumers of process heat are not able to be confirmed at the time the boiler and turbine plant design has to be finalised, the plant would be configured to maximise electricity generation, with the incorporation of suitable steam pass-out valves in the design, to accommodate heat use at a later date, if heat consumers subsequently come forward. (See also Ref. 16 below).

Ref.	Brief summary of issues raised	Summary of actions taken or show how this has been covered
4	There has been a failure to consult adequately including with young families and children. There were also concerns over the length of the consultation due to holidays.	The details of the consultation are set out in the main body of this document. We consider that consultation has been full and effective. We advertised in the South Wales Echo and provided notification of receipt of the original permit application and associated consultation arrangements in accordance with our procedures. At that stage we also provided additional notification to local stakeholders and community groups. We also conducted two public information events in the local area during June and July 2009. On-going progress with regard to the determination process was also provided by an Agency officer attending two further local stakeholder and community meetings. We provided notification of our 'minded to' decision during July, August and September 2010 in accordance with our procedure for consultation on Sites of High Public Interest (SHPI). We conducted a further public information event in the local area at the end of July to ensure that the local community had the opportunity to understand our draft decision and for them to be advised how they could make comment on it. This was supported by further additional notification to local stakeholders and community groups. Our consultation period was further extended at the request of the local community, in order to facilitate comments from people who may have been away on annual summer holidays at the time the consultation period initially commenced. The consultation period was extended until the 10th September to allow for the holiday period, and we have continued to consider representations received since then. Responses from local school teachers were received during this extended period.

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5	Applications such as this should be dealt with collectively by the Planning Authority and the Environment Agency working together, whereby neither party can opt out of their responsibilities to give accurate and unbiased opinions and advice, and to respond to any questions fairly and honestly.	The Planning process considers the need, scope and scale of proposed developments in the context of local and regional plans and local infrastructure requirements. The Environmental Permitting process considers the design and operational techniques associated with the plant in the context of its ongoing operation against its stated purpose. Although for the nature of this development there is no interdependent regulatory requirement between the two processes, both the Environment Agency and the Planning Authority are required to undertake consultation with each other in respect of the Environmental Permit and the Planning Application respectively.
6	There was concern whether the Environment Agency has sufficient resources and capability to continuously and stringently monitor emissions from the incinerator. Reference was made to emissions of dioxins in breach of emission limits at an incinerator on the Isle of Wight as well as other breaches of other permits.	We do have adequate resources and capability to ensure that the requirements of the permit are met and that operations at the site are suitably controlled. We will actively enforce the requirements and conditions of the permit by: a. Requiring continuous monitoring of the main pollutants for which limits are set and periodic monitoring for the other substances. b. In specific cases, carrying out audits of the operator's procedures and methods for emissions monitoring. c. Carrying out annual check monitoring by our own independent contractors. d. Regular announced and unannounced inspections. e. Adding or changing conditions in the permit if required. f. Requiring operators to inform us if they exceed any of the emission limits in the permit, or if they fail to comply with any operating conditions. g. Investigating non-compliance with any condition of the permit. h. Taking enforcement action if needed, including issuing notices, prosecuting serious breaches or potentially revoking the permit. This application needs to be determined on its own merits. What may or may not have happened elsewhere is not relevant to this application as it relates to different operations and plant. We are satisfied that adequate emergency procedures will be in place, conditions are included in the permit covering emergency and abnormal operation.

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7	The draft decision document records that in a review dated October 2006 it was concluded that the Newport Road and Philog AQMA's were no longer required. However, at Cardiff Council Public Protection Committee meeting on 8 June 2010, a report was discussed which recommended that an AQMA should be established for the Stephenson Court area of Newport Road. This was agreed by the committee. As the Stephenson Court area of Newport Road is within 1.5 km of the proposed site of the incinerator, the Environment Agency should investigate the effects of the incinerator on this new AQMA area before granting the permit.	We have sought and obtained further advice from Cardiff Council regarding the status of AQMA's in the city of Cardiff area. They confirmed that the Newport Road and Philog AQMA's were revoked on 01 February 2007, and there are currently no plans to re-declare either of these areas. They also confirmed that the consultation process regarding the declaration of an AQMA for the Stephenson Court area had now been completed, and that in the absence of any subsequent objections from statutory consultees, the AQMA would come into force once an Order had been drafted and approved by the council's Chief Legal Services Officer. The declared AQMA will be for the annual mean concentration value of Nitrogen Dioxide resulting from the road traffic in this localised area of Newport Road. In view of this, we have re-assessed both the applicants dispersion modelling study and our own check modelling study undertaken by our Air Quality and Assessment Unit (AQMAU). From this, we have established that the predicted annual mean process contribution of Nitrogen Dioxide resulting from the incinerator at the nearest point of the proposed Stephenson Court AQMA, is 0.11µg/m^3 This represents less than 0.3% of the annual mean EQS for this pollutant. We are therefore satisfied that the incinerator will not make a discernable difference to the air quality at this location.

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8	We were provided with a copy of the interim Health Impact Assessment Report (HIA) prepared for the Partnership by WHIASU/PHW primarily as information for the intended planning inquiry. This study does look at a broader range of general health and wellbeing indicators when compared with the detailed Human Health Risk Assessment (HHRA) provided by the applicant. The HIA Report summary suggested mitigation measures recorded in the conclusions of the report which included the following. (i) The community in Splott, Viridor Ltd., Cardiff Council and the Environment Agency Wales (EAW) should actively pursue a Liaison Group along the lines of the successful Merthyr Community Liaison Group, and that this group should be committed to informing the wider community about the broader issues that surround waste management. (ii) The community, Viridor, Cardiff Council and the EAW need to engage and make information about the plant's performance accessible to the whole community, i.e. produced in plain English and possibly a few other languages. (iii) The EAW needs to successfully establish with the community what the timing and nature of its monitoring efforts are that ensure that Viridor's facility operates within the guidelines laid down in the EAW's operating licence.	The contribution of the study with respect to informing details of 'vulnerable' groups in the local communities of Tremorfa & Splott is acknowledged. The Agency, however, believes that the detailed HHRA undertaken by the applicant and reviewed by our AQMAU adequately assesses the impact of the proposed facility on vulnerable groups, in relation to the specific pollutants that may be emitted from the installation. The aspect of the study relating to the desktop review of the academic literature covering the current state of scientific research into health and wellbeing impacts of waste incineration is addressed more fully in response Ref. 22 below, where a further review and consultation response by Cardiff & Vale University Health Board has been considered. With respect to the third element of the HIA study, workshop participants recognised that possible environmental negatives identified may have been based on their own perceptions, without detailed knowledge about incineration in general and how the proposed Viridor plant in particular will operate. The HIA study recommended the establishment of a Liaison Group, so that mitigatory measures might be employed to maximise any positive and minimise any negative aspects surrounding the scheme. The Agency fully supports such a conclusion. Members of Agency staff from our regulatory compliance team have already held positive preliminary discussions with Viridor concerning the value of setting up such a group. We also note that the establishment and support of a local Liaison Group is a Section 106 Agreement requirement on the applicant resulting from planning approval.

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9	The Bottom Ash produced by the incinerator will be a hazardous waste material. The EA should require Viridor to bring forward proposals to set up an operation to dispose or treat the ash in SE Wales.	Most Incinerator Bottom Ash (IBA) from municipal waste incinerators is likely to be non-hazardous waste. IBA is classified on the List of Wastes as a 'mirror entry'. This means that IBA must be assessed, and if found to possess any one of the fourteen hazardous properties (which include eco-toxicity) it would then be classified as a hazardous waste. A pre-operational condition (PO04)has been included in the permit requiring the operator to propose an ash sampling protocol to be submitted and approved by the Agency prior to any waste being burned at the installation. The specification and assessment of the bottom ash quality is important to establish subsequent appropriate disposal or treatment requirements. Subsequent disposal or treatment activities must take place at facilities regulated by us, where specific permit limits and requirements for ash content will be required and enforced. We are satisfied that the operator's proposed measures for handling, storing and disposing of bottom ash and APC residues from the installation are in line with BAT. The operator will be required to use appropriate registered carriers and treatment/disposal facilities for the subsequent off-site transport and processing of the ash. Permit condition 2.3.4 requires the operator to provide information to these facilities prior to them receiving the waste. It is the responsibility of the producer to ensure that hazardous waste only goes to facilities that are permitted to accept them for disposal / treatment. Any failure will be addressed in accordance with the Agency's Enforcement and Sanctions Statement. The operator will carry out a considerable amount of self monitoring using quality assured procedures which are subject to scrutiny and audit by the Agency. We are satisfied that the operator has the necessary competence to undertake this work. Alternatives to landfilling of ash do exist, and the applicant has considered recovery options for the bottom ash in the application. Bottom ash can be used for example in road construction or as an aggregate substitute. A Quality Protocol to determine the point at which IBA ceases to be classified as a waste and requires no further waste controls is currently under development.

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10	The EA cannot assume disposal of air pollution residues and other hazardous waste in landfill is available. Not only because it does not comply with the Welsh policy on zero waste to landfill and the proximity principle, but also because Grundon's landfill operation in Gloucestershire is of uncertain lifetime. Concerns were also raised about the operation of that facility.	Currently this facility is available although the permit is not prescriptive in requiring landfilling and Condition 1.5 will require them to keep their waste options under review and to recover it wherever practicable. The ongoing availability of landfill waste disposal facilities is also a waste strategy issue. However, landfill is not the only option available for APC residues. With suitable treatment and application, APC residues can be utilised in the chemical or manufacturing industry as an acid neutraliser or scrubber reagent. Operation of the Gloucestershire facility is outside the scope of this application but that site is regulated in accordance with our enforcement and prosecution policy.
11	Your Area Managers assertion on the website that 'plans are in place to operate this facility to the highest environmental standards' is false. Not only is the hazardous waste a problem, but also the lack of any credible proposals to use the 50MW waste heat.	We are satisfied that the installation will be operated to a high environmental standard, that waste will be disposed of appropriately and that measures will be in place to ensure that waste heat can be utilised where economically and technically feasible. See also Refs. 9, 10, 16, 17 and 50 in relation to waste handling and heat utilisation.
12	Question in relation to the reference to the HPA statement regarding the potential impact of nano-particles.	The contribution made by waste incineration to national emissions of particles is low. In 2007, national emissions of PM10 from incineration were 0.02% of the total compared to 18% for traffic and 22% for industry. In September 2009 the HPA reviewed their position statement on the impact on health of emissions to air from modern municipal waste incinerators and concluded that they should contribute little to local concentrations of air pollutants. This review included consideration of nano-particles. See also response to Ref. 1 above.
13	The EA Wales announcement said that the Agency had received specialist advice on health related matters – could you please supply as copy of this advice.	This advice was provided as the consultation response from Cardiff LHB. The consultation response was placed on Public Registers at the Environment Agency Area Office and Cardiff City Council offices.

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14	Question in relation to the claimed carbon footprint status of the proposed installation relative to the GWP impact assessment, and the indicated level of energy efficiency for CHP implementation.	The Global Warming Potential assessment (Section 10 – Appendix 6 of the application) considers a like for like assessment against other thermal treatment and combustion technology options for the disposal of waste. The energy released from combustion of the waste will result in some carbon footprint reduction as it will avoid the combustion of fossil fuels elsewhere for the production of energy. (See Ref. 16 below). High levels of energy efficiency can be achieved from CHP plant where increased levels of heat load are developed relative to the electrical power generation element.
15	Viridor should have considered future changes and trends in the composition of input waste when assessing the carbon footprint and energy efficiency of different treatment technology options.	Any changes to the physical composition and calorific value of the input waste brought about by future trends are likely to affect all thermal treatment technologies to a similar degree. In comparison with other thermal treatment options, the selected moving grate technology is able to accommodate a wider range of physical waste composition. The furnace is also designed to operate within a relatively wide range of calorific values to allow for the variety of different wastes that are burned.
16	Electricity only incinerators produce approximately twice as much carbon dioxide per KWh as coal fired power stations. CHP incinerator plants are possible, but are still inferior relative to coal or gas fired CHP.	The facility being permitted is a waste incinerator, and whilst the generation of electricity is an important and necessary feature of the facility, it is not its primary function. As such, the efficiency of energy recovery should not be compared against a dedicated power station, but against other waste thermal treatment technologies and BAT. In addition, generation of energy from burning waste means that fossil fuels will not be burned to generate that same amount of electrical energy elsewhere, thereby contributing to a lower net release of climate change gases given that the waste will also have a biogenic carbon content. Whilst CHP is to be encouraged it depends on there being a user for the heat. If viable consumers of process heat are not able to be confirmed at the time the boiler and turbine plant design has to be finalised, the plant would be configured to maximise electricity generation, with the incorporation of suitable steam pass-out valves in the design, to accommodate heat use as a later development if heat consumers are subsequently identified.

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17	Why in response to the Viridor Planning Application did the EA fail to recommend to Cardiff Council that the application should be refused when it is not appropriately sited for a year round heat load for any reasonable fraction of the potential 50MW heat generation capacity? DECC and WAG have long highlighted hundreds of sites with sufficient heat loads for CHP incinerators. Viridor have not made any offer to Cardiff Council to share in the costs of installing a district heating network, so have failed to explore all opportunities to utilise waste heat.	In its consultation response to Cardiff County Council in respect to the original Planning Application the Environment Agency recommended that - *"The Local Planning Authority should regard the recovery of energy from the incinerator as a significant factor when considering the location of the proposed development.* *Therefore the proposed location of the incinerator is a significant factor when considering the amount of energy that can usefully be recovered. In remote locations or locations with poorly developed infrastructure, energy recovery may be impaired."* We consider that the Heat Plan supplied as part of the EPR application represents a thorough investigation of potential heat consumers within vicinity of the plant for CHP evaluation. Agreements and any undertaking of cost sharing arrangements between developers is not a matter for consideration in determination of an EPR permit application.
18	Since the plant is not covered by the GCETS and will be a project lasting more than 10 years, it should be subject to the commitment under the Climate Change Act to progressively reduce CO2 emissions. Viridor should be required to produce a base line assessment of how their plant could meet this commitment.	Registration to the CRC Energy Efficiency Scheme applies to businesses at a corporate organisational level rather than at an individual plant basis. Viridor are registered to this scheme, and the plant data will need to be included as part of their return when it becomes operational.

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19	The UK government asks other large CO2 emitters to consider Carbon- Capture Ready design. Viridor should be required to consider Carbon Capture and Storage (CCS) in their technology assessment.	See Ref. 16 above. CCS is an issue for consideration in plant design and specification for the production and supply of electricity from the large scale combustion of solid fossil fuels. This plant is being permitted as an incinerator, the purpose of which is the disposal of waste by thermal treatment. . In the event that CCS becomes 'available' for plants such as this it will be included as part of our periodic reviews.
20	Under B3.4 of the decision document, you have failed to include the condition of the Waste Framework Directive (Article 23(4)) – "It shall be a condition of any permit covering incineration or co-incineration with energy recovery that the recovery of energy takes place with a high level of energy efficiency." You could and should add a requirement covering the 'high level of efficiency' at this stage.	This relates to the revised Waste Framework Directive that will come into force in December. Through conditions in the permit covering energy efficiency , the associated reporting requirements for energy production and consumption by the installation and operational controls, we are satisfied that the recovery of energy will take place and that a high level of energy efficiency will be achieved. Therefore, this requirement is included within the permit conditions. The directive is not yet in force.
21	Question in relation to the status of AQMA's in Cardiff, and media reports that an area around Stephenson Court on Newport Road has already been declared as an AQMA. Now understand from the Council that this is inaccurate, and that consultation on the declaration for this area has only recently been completed. The Agency should confirm the current AQMA status of this area, and consider potential impacts on it.	See response to Ref. 7 above.

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22	In its review of the existing guidance regarding the potential health effects of waste incinerators, the Agency has drawn conclusions from secondary and tertiary research based on unreliable sources and cherry-picked data. It has not considered in its review the study by Porta et al (published December 2009).	We made a further additional consultation request to Cardiff University Health Board, asking them that in view of this comment, did they see any reason to review the advice provided in their consultation response provided at the initial application stage. After seeking further input and additional advice from both the HPA and Public Health Wales, Cardiff and Vale University Health Board confirmed that in respect to the specific scientific issues, studies and their interpretation, they accept the conclusion reached by the HPA in respect of effect on health. As a result of their detailed review of the Porta study paper and other recent scientific review papers on this subject, the HPA recorded the following conclusion in their assessment and advice to the LHB. 'You can, of course, argue that the results from some of the studies on older incinerators indicate a need for caution. However, in view of the much lower levels of emissions from modern incinerators, the HPA confirms its view that, although it is possible that such small additions to the environment could have an impact on health, it is likely that any effects would be very small.'
23	Concern about control of what gets burnt, and the scenario where particularly noxious substances inadvertently find their way into the wastes to be incinerated.	The permit restricts the waste types that may be incinerated and no hazardous wastes are included. However, it is recognised that small quantities of household chemicals may be contained in the incoming mixed municipal waste and the incinerator is designed to cope with such material within the operating parameters set out in the permit. Pre-operational condition PO08 also requires the operator to produce a detailed waste acceptance procedure prior to commissioning of the plant
24	Viridor Waste Management is a company with a track record of criminal violations of environmental regulations. Their past record provides no confidence in their capability to operate the plant safely.	We are satisfied that Viridor will be able to operate the installation so as to comply with the conditions we have included in the permit. Viridor have sufficient resources and expertise to operate the proposed installation. The record of enforcement action against them is not one which would lead the Agency to conclude that they are an unsuitable operator for the proposed facility.

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25	There are no detailed plans handling, storage and disposal of ash from the incinerator.	Arrangements for the handling, storage and disposal of ash from the process are detailed in Section 11 of the application, and our assessment of these is recorded at B5 and C1.5 of this document. See also Ref. 9 above.
26	The consultation period is ending too soon (01 September). Many people who should be consulted are away on holidays , schools in the effected area for example. The consultation period should be included to include such people.	See ref 4 above
28	Concern that information about the application was not on the EA website.	Information regarding permit applications is available on our website via - http://www.environment-agency.gov.uk/research/library/consultations/65546.aspx Information regarding our draft decisions is available via - http://www.environment-agency.gov.uk/research/library/consultations/80798.aspx Notification information via both web pages is only posted for a period of time corresponding to the stated consultation period. Notification of receipt of this application was also provided by advertising in the South Wales Echo on 07 May 2009.
28	Greenpeace say that they do not believe that incinerators can operate at 100% efficiency when burning plastics and that furans and dioxins are produced when burning PVC plastics.	The permitted waste inputs are specified in Table S3.2 of the permit. Through this specification, the waste acceptance procedure required through pre-operational condition PO08 and the operational techniques incorporated in the permit for loading of waste into the combustion units, we are satisfied that the incineration plant can be operated at its design efficiency. It is correct to identify that dioxins can be produced when burning PVC type plastics. However, we are satisfied that any dioxin release can be minimised and controlled within the specified limit through control of the waste input as described above, suitable design of the combustor and boiler plant flue gas stream parameters and the activated carbon injection abatement system.

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29	Concern of hearing reports that an adjacent facility to the incinerator will be set up to store and process the waste residues from the incinerator.	This EPR permit is for the Schedule 1, Part 2 Incineration activity and the directly associated activities detailed in Table S1.1 of the permit. This extends to the collection, collation and storage of wastes produced by the process, prior to their transportation off-site for subsequent recovery or disposal operations at appropriate permitted facilities. Whilst the Planning Approval may enable development of infrastructure at the site for the further processing of waste residues produced by the installation, operational activities relating to this aspect of the development are not included or allowed in this EPR permit. If the applicant wishes to extend the range of activities undertaken at the site, they will have to apply to the Environment Agency for a variation to this permit. Or apply separately for a further permit to cover any additional operations at the site.
30	Concern regarding the location of the plant and its proximity to highly populated areas which includes schools, nurseries and children's play areas and whether these have been taken into account. It is also close to the greatly improved flagship Cardiff Bay area.	Review of the human health risk assessment is recorded at Section 7.3.2 of this document. We have reviewed the Air Quality Assessment provided in the application and the re-submitted HHRA provided by the applicant which assessed the maximum potential impact of the facility. These assessments have also been audited by AQMAU and we are therefore satisfied that they have used appropriate methodology and that the conclusions presented in the reports represent a reasonable assessment of the predicted emissions from the facility and their potential impact on human health. These assessments conclude that there will be no significant risk to health caused by operation of the plant. As the assessments have been based on the maximum potential impact we are therefore satisfied that there no significant risk to human health at any facilities or recreational areas within the locality of the incinerator. We have also reviewed the wastes that can be accepted for processing at the facility and the emission control and abatement systems that will be included in its design, and are satisfied that the emission limits contained within the permit can be achieved.
31	Concern regarding the effects that emissions from the	The US-EPA HHRAP methodology used in the re-submitted Human Health Risk

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	plant may have on local food production and consumption. Many people are now growing their own vegetables and herbs in their gardens and local allotments.	Assessment, considers the location where the maximum deposition of pollutants that can result in bioaccumulation (dioxins and metals) takes place. It then makes the assumption that a farmer and his family manage the land at this location, and produce sufficient food from that land to satisfy their dietary needs throughout the year. This worst case prediction of intake of these pollutants via this route by members of the theoretical 'farmer family' is then compared against a 'daily recommended maximum dose' standard. The HHRA was audited by AQMAU, and we have confirmed that there is no likelihood of dioxin intake exceeding the daily recommended maximum dose standard, even in this worst case scenario. We have also confirmed that the US-EPA reference doses for metals will not be exceeded. Given that vegetables and herbs grown by residents in their own gardens or local allotments will only form a relatively small part of their total annual dietary intake, we are satisfied that tolerable dose rates will not be exceeded and that there will be an insignificant impact on health as a result of this intake mechanism.
32	Concern regarding the potential for emissions of odour from the chimney.	We are satisfied that there will be no unacceptable odour from the Installation as a whole see section C9. Specifically with regard to odour from the stack (chimney), it is often associated with the release of larger molecules of organic compounds particularly those containing sulphur. We are satisfied that the majority of these compounds will be oxidised to SO2 and CO2 through the minimum combustion parameters required by the WID prior to release from the exhaust stack. Indeed, some industrial processes utilise thermal oxidation as a technique for the abatement of odorous releases from their process. Odour associated with ammonia can result from some combustion processes where it is used as the reduction reagent in the Selective Non-Catalytic Reduction (SNCR) abatement of nitrogen dioxide. However this installation will utilise urea as the reduction reagent in the SNCR abatement process, and we are therefore satisfied that there will not be any significant release of ammonia from the process.

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33	There will be additional pollution from the lorries transporting waste to the incinerator. It would seem that the effect on air quality has only been modelled in the area of St Mary Street, but other areas of heavy traffic such as Newport Road and the Central Link which are closer to the site have not been modelled.	The Environmental Permitting Regulations are concerned with control of emissions from the site and in determining this permit under these regulations we have considered the impact of emissions from the site on local air quality. Although the new site will result in additional traffic on local routes, this addition is expected to be a small percentage of current traffic load. We would therefore, expect that the additional pollutant load would not have a significant impact on air quality in the area. Air Quality impact of additional traffic would have been a consideration for the planning authority in reaching their decision.
34	The Environment Agency seems to be ignoring possible cumulative effects of air pollution on the Newport Road area, as well as in Splott, Tremorfa, Adamstown, Rumney, Butetown and other areas of Cardiff. The Splott and Tremorfa residents already suffer from pollution, dust and odours from the Tremorfa and Eastmoors steelworks.	See also Refs. 7 and 33 above and Ref. 57 below. The Air Quality Assessment report provided with the application includes consideration of a number of data sources of existing ambient air pollutant background values, and these have been included in the air quality impact assessment. The air quality assessment has considered worst case impacts and therefore we are satisfied that the impact of the site on air quality in all localities is not significant, regardless of whether the locality has been specifically referred to within the assessment.
35	Cardiff residents have not been properly consulted on this proposal. It notes that just 26 people turned up to its public consultation sessions last year.	See Ref 4 above
36	A school is located within a housing estate just off from the main trunk roads, concern that increased traffic and congestion around the local area would force more motorists into 'rat runs' close to the school, this will put pupils at greater risk.	Issues relating to infrastructure development, access and traffic management resulting from development proposals are matters for consideration by the Planning / Highway Authority.
37	The incinerator does not make economical sense, Cardiff aims to recycle 70% of its waste by 2025 and this target is likely to be met sooner than this. Therefore in the near future there will not be enough local waste to feed the incinerator.	The environmental permitting regime does not require an applicant to demonstrate need. We have had regard to the objectives of the Waste Framework Directive-see section D1.2. Schedule 3 of the permit specifies which wastes can be burned in the incinerator so as not to undermine recycling/recovery.

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38	Does Viridor have the credibility they claim in maintaining low noise pollution levels, given that they were recently halted from building a Waste Transfer Station in Edinburgh due to noise problems?	The issue relating to the Waste Transfer Station in Scotland was for a different type of operational activity. We are satisfied that the predictive noise assessment study provided by the applicant in their application for this site is a reasonable quantification of the potential impact of noise from operations at the site. However, pre-operational condition PO06 in the permit requires the operator to implement a programme of noise monitoring to establish actual noise levels during plant commissioning and operation.
39	Many of the consultation documents on your website have been in English only. I believe this deprives people of Wales from a fair opportunity to respond to the consultation and may breach your own Welsh Language policy. For this reason I think you should extend the consultation period.	See Ref. 4 above. The notification of receipt of the original application and corresponding consultation arrangements was advertised in the South Wales Echo in both English and Welsh language. Posters advertising the information sessions were bilingual. Some of the information provided at the information sessions (particularly that describing an Energy from waste process) was also made available bilingually. Welsh speaking staff were available at each of the information sessions, in order to assist attendees who preferred to use the Welsh language. As described previously, the consultation period was extended beyond that associated with our normal arrangements.
40	Cardiff Council have agreed for vehicles carrying toxic waste to drive through residential areas and close to the city centre. This needs to be investigated further by the Agency.	Issues relating to infrastructure development, access and traffic management resulting from development proposals are matters for consideration by the Planning / Highways Authority. We will ensure that appropriate Duty of Care arrangements and procedures are in place for waste materials that are transported to and from the site. The permit requires that the main hazardous waste leaving the site (air pollution control residue) is transferred on site and removed from site in sealed containers.

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41	The H1 assessment part 2 erroneously classifies fly ash as 'non-hazardous' (H1 assessment part 2 page 19), invalidating the entire assessment. Viridor have repeatedly stated in documents that fly ash is a hazardous waste that will require disposal by landfilling. The EA also state in their draft decision that APC residues or fly ash are classified as hazardous waste (not inert) and must be disposed of at a suitable hazardous waste treatment/disposal facility. Viridor's Residue Management Plan proposes mixing fly ash with Incinerator Bottom Ash (IBA) and treating the combination as non-toxic.	We are satisfied that the proposed design of the plant will enable APC residues and Bottom Ash + Boiler Ash to be collected and stored separately, and that the proposed operating techniques ensure that this will take place. The H1 assessment provided by the applicant separately categorises and quantifies 'APC' and 'Bottom Ash + Boiler Ash' residues. It does not reference 'Fly Ash'. The process description within the application states that fly ash will be collected with the APC residues by means of bag filters. We are therefore satisfied that only boiler ash will be collected with the IBA and that both these waste streams are similar and suitable to be mixed. The different forms of waste ash and other combustion residue may be described as follows: (i) Incinerator Bottom Ash (IBA). This is the solid mass material that is discharged from the end of combustion grate and includes some finer siftings that transmit through the grate as the main ash mass is conveyed along the grate. (ii) Boiler Ash. This comprises larger particles of ash that are carried over in the flue stream gas to the first stage of the boiler where they precipitate from the gas stream and are collected. It also includes scale residues that deposit on the external surfaces of the boiler tubes, which have to be periodically removed to maintain efficient heat transfer from the flue gas stream to the pressurised water within the boiler. (iii) Fly Ash. This is finer particles of ash that pass though the boiler system and are carried over in the flue gas stream to the reaction chamber where the acid gas abatement reagent and activated carbon is injected for treatment of the flue gas. Fly ash particles, spent abatement reagent and activated carbon are then collected together in the bag filter abatement system before being periodically removed to form a composite waste residue. This combined waste stream is referenced as Air Pollution Control (APC) residue. The Boiler Ash can be combined with either the Bottom Ash from the grate or the APC residues according to the nature of the plant and its design and layout.

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42	The Human Health Risk Assessment does not discuss escaping fly ash or dust from the incinerator facility.	The fly ash will be collected along with the APC residue by means of a bag filtration system. The fly ash / APC residue will be collected, transferred and stored within sealed systems and silos inside the main building of the facility. They will then be conveyed to sealed container vehicles within the building prior to transportation to an appropriately authorised hazardous waste treatment or disposal facility. We are therefore satisfied that appropriate measures are in place to prevent the release of fly ash and dust from the facility. As a result it is not necessary for the release of fly ash to be considered within the Human Health Risk Assessment as the hazard is prevented from reaching the environment at source.
43	The existences of Pengam Moors, Pengam Pavilion and Rover Way East allotments approximately 2.5 km north east of the proposed site have not been addressed in relation to the health impact on residents as long term consumers of locally grown food.	See ref. 31 above.
44	Regarding the sites Global Warming Potential Review, the declaration of 65% efficiency for an energy from waste CHP plant is unrealistic.	See Ref. 14 above. High levels of energy efficiency can be achieved from CHP plant where increased levels of heat load are developed over the electrical power generation element. However, this does require the higher heat load factor to be constantly available throughout the year. The export of a significant proportion of 'lower grade energy' in the form of low pressure steam or hot water to an external heat load requirement would enable this level of efficiency to be achieved. In the absence of potential steam users the facility will be operated to maximise electricity production, but it is recognised that where the export is not feasible conversion efficiency will be lower than 65%

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45	The Heat Plan makes no provision for the handling of the unused heat; 50MW of heat dumped to the environment, either to air or water represents a major source of heat pollution.	Excess heat will be dissipated by means of air coolers which is considered to be BAT where dissipation of waste heat is required for a combustion unit of this size. The Operator has identified some options for steam users within the locality and we have included within the permit a requirement for such users to be reviewed on a regular basis. Where a technically and economically feasible opportunity for the site to export steam is identified then the permit requires that this is realised. Therefore, where possible the permit ensures that the amount of unused heat that needs to be dissipated into the environment is minimised and that BAT is used do so where necessary.
46	Viridor's H1 assessment part 1does not consider odour released by trucks waiting at the site or en route to the site.	Kerbside collected municipal waste will be delivered to the site in enclosed Refuse Collection Vehicles (RCV's) or covered transport lorries. We do not consider that this delivery system will present a significant odour release risk whilst the vehicles traverse the site prior to unloading their waste inside the waste reception hall of the facility. Traffic and transportation issues on the external public road network are matters for consideration by the planning / highway authority.
47	Viridor's maps fail to take into account Moorland Nursing School and Moorland Primary School located less than 1km northeast of the incinerator; and Adamstown and Tredegar Primary Schools which are located less than 2 km north of the site. To our knowledge there has been no opportunity for these schools to be part of the consultation process. We understand this to be in contravention of existing law and policy regarding rights of the child.	See Ref. 33 above, in respect to identification of receptors for impact assessment. See Ref. 4 above in respect to consultation arrangements.

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48	Noting the OPRA spreadsheet in Viridor's application materials, the site falls within 2 km of the St Mary Street AQMA declared in 2002 and is also likely to fall within 2 km of the proposed Stephenson Court AQMA currently under discussion by Cardiff Council. The OPRA profile also declared that the site does not lie within a flood plain, but has been found to rest within a Flood Zone B area. The OPRA profile noted in the draft decision is therefore incorrect.	The flue gas emission stack at the site is located at approximately 2km from the nearest boundary of the St Mary Street AQMA. When declared, the new Stephenson Court AQMA on Newport Road will fall within 2km of the emission stack at the site. The site does not fall within an indicative flood risk area according to our current mapping of flood plan designated areas. The OPRA scheme is a risk appraisal methodology for the calculation of charging arrangements within our EPR permitting regime. It should be noted that it is not used as a tool to quantify the impact of released pollutants at specified receptors. The OPRA score for an installation can be reviewed and updated at any stage throughout the life of the permit.
49	Concern was raised about the impact on the surroundings during construction, particularly from additional noise and traffic issues.	Construction and development at the site and associated traffic or noise issues are within the remit of the local planning authority. We will regulate the operational activities at the site as defined in the permit, and this will commence when any process materials are first brought to the site for initial storage.
50	How will the energy generated from the plant be used and how much energy will be generated?	A significant proportion of the energy released from the plant by the combustion of waste will be captured as high pressure steam via an incorporated boiler system. The steam can be used to drive a turbine to produce electricity for supply to the Grid, or it can be circulated to local heat consumers to supply their process or space heating needs. A third option is a combination of both of these utilisations in a CHP arrangement, where a defined process heat demand influences the boiler and steam turbine design and the total amount of energy that can be recovered. Typically the plant could produce 20MW of electricity and 50MW of heat for potential distribution. 20MW (175,000 MWh annually) of electricity would be sufficient to supply 42,000 average households.

Ref.	Brief summary of issues raised	Summary of actions taken or show how this has been covered
51	The Environment Agency's consultation process has been biased by the EA's presentation of the scheme as being one of energy-from-waste, when in reality it's one of waste disposal by incineration with poor energy recovery, and by falsely stating it meets the 'highest environmental standards'.	The application made by Viridor under the Environmental Permitting Regulations is to operate an incineration activity under Section 5.1 Part A(1)(c) of Schedule 1 to the regulations. This is the correct listed activity as defined in the regulations. We have determined the application on the basis that it is for a disposal activity. However, energy will be recovered from the process through the production of electricity generated by the steam turbine, which utilises heat captured from the incineration process. Our assessment of energy efficiency and energy recovery for the installation is recorded at Section B3 of this document. We consider the consultation has been clear about what is being proposed.
52	The EA's consultation process has failed to consult adequately with the Environment Department of Cardiff's County Council.	We sent copies of the application to both the Environmental Health and Planning departments at Cardiff Council as part of the Application Consultation process, inviting them to submit comments on it in accordance with our 'Working Together' arrangements. Additionally, we provided copies of our 'minded to decision' draft documents to the Council, inviting further comments and input to this stage of our determination. As part of this consultation, we also sought clarification from Cardiff Council regarding the status of AQMA areas within the city.
53	The EA consultation process has taken no steps to involve children and young people, in accordance with the UN Convention on the Rights of the Child.	Our extended consultation period took account of the return from annual holiday of children attending local schools. As a result of this extension, we did receive representations from teachers and representatives of local schools. The HHRA provided by the applicant considers a range of potential receptors from infant stage through to parents and adults in the local population in respect of the worst case impact on their health. The HHRA concludes that there will be no significant impact even based on worst case scenario. We therefore believe that the health of children would not be compromised in this area. Therefore, we believe that we have assessed potential impact of the development on children and enabled them to participate via their schools in the consultation. process.

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54	The EA's consultation process has applied to the scheme that was initially proposed and not the one for which the Council's planning department have given permission.	See Ref. 29 above. Our determination process has assessed the detail and potential impact of the activities at the site as recorded in the EPR permit application. Any additional activities on site may not occur until any required environmental permissions are in place. The Planning and Development Control process and the Environmental Permit Application process are separate regulatory regimes. The Environmental Permitting regime is primarily concerned with the ongoing operational activities at the site and the impact that these activities may have on the environment.
55	The EA's consultation process has not adequately considered or informed the majority of people in the immediate area of the proposed incinerator and the dangers it poses to their health and well being.	See Ref. 04 above
56	The city of Cardiff is surrounded by hills which are populated by residential communities. These high level areas are subject to direct emissions due to being at stack height.	We are satisfied that the dispersion modelling study supplied with the application included consideration of local topography and terrain details. Our AQMAU have reviewed and audited the dispersion modelling study and are satisfied that these factors have been considered. And that the impact on these receptors has been suitably evaluated.
57	The pollution from the incinerator will be in addition to the Celsa steelworks and other emissions in the area. This means that the combined pollution is not included in the Viridor pollution calculations over Cardiff.	The Air Quality Assessment provided in the Application includes consideration of a number of data sources of existing ambient air pollutant background values. The applicant has also initiated their own study of existing background measurements for nitrogen dioxide and other pollutants at locations near to the proposed site. We are therefore satisfied that other existing local emission sources have been considered in the assessment, as part of the recorded existing ambient background concentrations.
58	The Viridor incinerator as it ages will emit more and more toxic pollution over the city and we cannot rely on the Agency to control and check the emissions from the incinerator.	Through the conditions and emission limit values set within the permit, we will ensure that the plant is operated and managed to maintain its emission performance throughout its working life.

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59	Concerns relating to the potential impact on local residents living in multi-story accommodation at locations close to the proposed site.	The air dispersion modelling study provided with the application included a sensitivity assessment for elevated receptors given the proximity of nearby multi-story residential properties. This analysis concluded that predicted impacts over a range of elevated heights are marginally less than the ground level concentration values at these receptor locations. Our AQMAU have also undertaken a further review of this aspect of the modelling study, and have confirmed that there will be no significant change to the process contribution experienced at these elevated receptors compared with those at ground level at these locations.
60	How do you rationalise a no damage assurance in view of the harm to health (if of susceptible persons) of any increase in NO2. There is also the harm to health and to vegetation of secondary ozone.	We have concluded from our air quality impact assessment that predicted emissions from the installation will not result in an exceedance of any EQS or other assessment standard. The predicted process contribution of NO_2 is very small compared to the existing background value caused by other sources. The assessments conclude that acute impacts on health by inhalation of gases and fine particles would be very small and are unlikely to pose a significant risk to human health. Our additional consultation with Cardiff LHB and their subsequent response has confirmed this view. Any secondary ozone generation effect will take place in elevated levels of the atmosphere, and is therefore unlikely to present a risk to ground level ecosystems. CCW have provided their agreement with our conclusion on the assessment of risk and impact on nearby Habitat sites.
61	Recent press coverage has identified that there are problems of dust release at a landfill site in Gloucestershire where fly ash is sent for disposal. Will this be an issue for the fly ash produced at this plant.	See Ref. 10 above.

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62	Concern regarding the need for the Agency to consider the pending changes to the Waste Framework Directive that are due to come into force on 12 December, and how any changes to energy efficiency requirements that might be contained in this update would be considered by the Agency.	See Ref. 20 above. We are aware of the pending changes within the WFD. However, the standards for energy efficiency for incinerators are determined by the requirements of WID and IPPC. We set conditions within the permit based on best available techniques as guided by the BREF and our sector guidance note EPR 5.01 on incineration. We are satisfied that the proposals meet the required standards. The facility is being permitted as an incinerator for the disposal of waste, and on this basis it is therefore considered to be a disposal activity. Whilst the generation of electricity and the attainment of a high level of energy efficiency is an important and necessary feature of the facility in line with the requirements of the Waste Incineration Directive, it is not its primary function as a disposal activity.