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

Our decision document recording our decision-making process

The Permit Number is:	EPR/EP3731XL
The Operator is:	INEOS Chlor Limited
The Installation is located at:	Runcorn Energy from Waste Facility Picow Farm Road Weston Point Runcorn, Cheshire WA7

What this document is about

This is a decision document, which accompanies a permit.

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

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

Since consulting on our draft decision The Waste (England and Wales) Regulations 2011 have come into force. Amongst other things these Regulations implement the Waste Framework Directive. In view of this we have amended conditions 1.2 and 1.4 slightly. The changes are not significant. Section 7.1.2 anticipated the implementation and addressed the relevant articles and has been clarified by removing the references to the old directive. We are satisfied the revised conditions are appropriate.

Preliminary information and use of terms

We gave the Application the reference number EPR/EP3731XL/A001. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we have given the permit is EPR/EP3731XL. We refer to the permit as "the **Permit**" in this document.

The Application was duly made on 21 October 2009.

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

INEOS Chlor Limited's proposed facility is located at Weston Point, Runcorn. We refer to this as "the **Installation**" in this document.

How this document is structured

- Executive summary of our decision
- How we took our decision
- The legal framework
- Description of the Installation and general issues
- Environmental issues: emissions and their control
- Other relevant issues
- Before and after operation commences, and after it finally ceases
- Other relevant legal issues
- Annexes

Contents

Glossary of acronyms used in this document

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

APIS	Air Pollution Information System
AQMAU	Air Quality Modelling and Assessment Unit
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous Emissions Monitor
DAA	Directly associated activity
DD	Decision document
EAL	Environmental Assessment Level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EPR	Environmental Permitting (England and Wales) Regulations 2010 (SI 2010 No. 675)
EQS	Environmental quality standard
HRA	Human Rights Act 1998
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC)
LCPD	Large Combustion Plant Directive (2001/80/EC)
LfD	Landfill Directive (1999/31/EC)
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
PC	Process Contribution
PEC	Predicted environmental concentration (process plus background)
PPS	Public participation statement
PR	Public register
RGS	Regulatory Guidance Series
SAC	Special Area of Conservation
SED	Solvent Emissions Directive (1999/13/EC)
SCR	Selective catalytic reduction
SGN	Sector guidance note
SHPI(s)	Site(s) of High Public Interest
SNCR	Selective non-catalytic reduction
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SWMA	Specified waste management activity
WFD	Waste Framework Directive
WID	Waste Incineration Directive (2000/76/EC)

1 Our decision

This Application is to operate an Installation subject to the Waste Incineration Directive.

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

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

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

2 How we reached our decision

The Application was duly made on 21 October 2009. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below in respect of information notices and additional information.

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

We carried out consultation on the Application in accordance with the EPR, our statutory PPS and our own RGS Note 6 for Determinations involving Sites of High Public Interest. We consider that this process satisfies, and frequently goes beyond the requirements of the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, which are directly incorporated into the IPPCD, which applies to the Installation and the Application. We have also taken into account our obligations under the Local Democracy, Economic Development and Construction Act 2009 (particularly Section 23). This requires us, where we consider it appropriate, to take such steps as we consider appropriate to secure the involvement of representatives of interested persons in the exercise of our functions, by providing them with information, consulting them or involving them in any other way. In this case, our consultation already satisfies the Act's requirements.

We advertised the Application by a notice placed on our website, which contained all the information required by the IPPCD, including telling people where and when they could see a copy of the Application. We also placed an advertisement in the Runcorn and Widnes Weekly News on 5 November 2009 and the Liverpool Echo on 6 November 2009. In order to clarify the locations of where the Application could be seen during the consultation period, the advertising was repeated in the same newspapers on 7 January 2010.

We placed a paper copy of the Application and all other documents relevant to our determination (see below in respect of information notices and additional information) on our Public Register at our Birchwood Office in Warrington and also sent a copy to Halton Borough Council for its own Public Register. Anyone wishing to see these documents could do so and arrange for copies to be made. The Applicant also provided a number of copies of the Application on CD, these were also accessible from the Public Registers. We distributed a number of copies of the Application on CD to members of the public and local councillors following requests. Copies of the Application CDs were also made available at the Runcorn Direct Link office and at two libraries in Runcorn and one library in each of Frodsham and Widnes.

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

Halton Borough Council Environmental Health Department

Food Standards Agency
Halton and St Helens Primary Care Trust/Health Protection Agency
Health & Safety Executive

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

In addition to our advertising the Application, we undertook a programme of extended public consultation. Public surgeries were held on 25 November 2009 and 27 January 2010 at a recreation hall in Runcorn. In order to publicise these events, press releases advertising the Application and the details of the surgeries were issued to local media in the Halton and Cheshire area on 17 November 2009 in respect of the first session and 12 January 2010 for the second. We also sent copies of the press releases (on both occasions) and information on the Application process to local councillors, MPs, MEPs, parish councils and other local interest groups. Written comments were also accepted by the Agency well beyond the formal consultation period.

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

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued five information notices on 14 December 2009, 19 January, 3 February, 17 May 2010 and 6 August 2010. A copy of each information notice was placed on our public register and sent to Halton Borough Council local authority for inclusion on its register, as were the responses when received.

In addition to our information notices, we received additional information during the determination from INEOS Chlor Limited;

- An updated health impact assessment; received 17 November 2009
- Information concerning an updated noise assessment; received 14 May 2010.
- Information clarifying the basis of assessment of the hazard quotient used in the HHRA; received 17 May 2010.
- Information concerning contaminated fire water control; received 28 May 2010.
- Information clarifying certain definitions and concerning the impacts on local non-statutory conservation sites; received 30 July 2010.
- Information correcting a typographical error (POCP rankings); also received 30 July 2010.
- Information clarifying the location of the combustion chamber temperature probes; received 27 August 2010.
- Information concerning the fate of the APC residues; received 10 September 2010 in response to a request by email dated 26 August 2010.

- Information correcting a typographical error (emission deposition rate units); received 18 November 2010.
- Information describing the airport flight path; received as two emails 30 November 2010 in response to a request by email dated 29 November 2010.
- Further information clarifying some noise issues; received 17 December 2010 in response to a request by email dated 13 December 2010.
- Further information clarifying the handling of flood water arisings and the restrictions to throughput; received 26 January 2011 in response to a request by email dated 17 January 2011.

We made a copy of this information available to the public in the same way as the responses to our information notices.

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

Following the public consultation in February 2011 a number of errors were identified in this document, either as part of the consultation process or by ourselves. The most noteworthy are listed as follows:

- Section 5.4: in the final table, incorrect units and values for dioxin information; omission of units for other pollutants. The table has been repaired.
- Section 5.5: incorrect statement of abatement plant inventory. There are more items of abatement plant than originally indicated.
- Section 6.3: in the final table, the predicted GWP contributions were incorrectly calculated. The repaired table shows that the selected abatement option for NO_x abatement, SNCR, was correct.

There are no changes to our conclusions as the result of these corrections.

3 The legal framework

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

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

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

We consider that it will ensure that the operation of the Installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

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

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

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

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

The definition of a WID "incineration plant" includes:

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

Many activities which would normally be categorised as "directly associated activities" for EPR purposes, such as air pollution control plant, and the ash storage bunker, are therefore included in the listed activity description.

An installation also comprises any unlisted "directly associated activities", which at this Installation includes the generation of electricity using a steam turbine. This is one installation, because the incineration plant and the steam turbine are successive steps in an integrated activity.

Together, these listed and unlisted activities define the legal boundary of the Installation.

Prior to the Application being made, there was some discussion with INEOS Chlor Limited regarding which activity better described the proposed plant. The description in Section 1.1 Part A(1)(a) – "burning any fuel in an appliance with a rated thermal input of 50 or more megawatts" – may have equally described the activity in this case. INEOS Chlor Limited applied for a permit under Section 5.1 A(1)(c) and we agreed that this description covered the activities proposed. In either case the IPPCD and WID would apply.

4.1.2 The site

The site for the energy from waste (EfW) facility is located in an area known as Weston Point, to the north of the INEOS chemicals manufacturing operation. The site includes an area of partially used rail sidings along its eastern boundary running parallel to Picow Farm Road. This provides the site with a rail link to the north bound line at Runcorn Railway Station. The area to be occupied by the new facility is currently industrial brownfield land that is in

partial use containing workshops, a former laboratory, training centre, offices, external storage areas and redundant fuel tanks.

The site is adjacent to operational salt works, a Scottish and Southern Energy power plant and Weston docks in the north and west and a caustic tank farm directly to the north of the site boundary. Other surrounding land uses include residential properties approximately 50m to the south west, the village of Weston 100m to the south, recreational grounds to the east of the site across Picow Farm Road, which forms the eastern boundary of the site.

Overall, the site slopes gently from east to west towards the Mersey Estuary. This is a Special Protection Area (SPA) designated for its nature conservation importance in relation to the feeding and roosting of various bird varieties, Ramsar site and Site of Special Scientific Interest (SSSI). Lying between the western site boundary and the Mersey Estuary are the Weaver Navigation, Manchester Ship Canal and the Runcorn and Weston Canal.

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

The site is L-shaped and allowed for two possible orientations of the EfW plant. At an early stage of the project, discussions involving Halton BC and the Applicant concluded that the primary item for consideration was the location of the stack since this was deemed to have the greatest potential (visual) impact on the local community. Thus a position was chosen to the north end of the site since this gave the greatest separation to the nearest local residents (at Clarks Terrace). Having specified this point, the configuration of the remaining main plant items was inherently set by working backwards through the process sequence. This left the 'leg of the L' for some of the auxiliary items including the cooling water towers

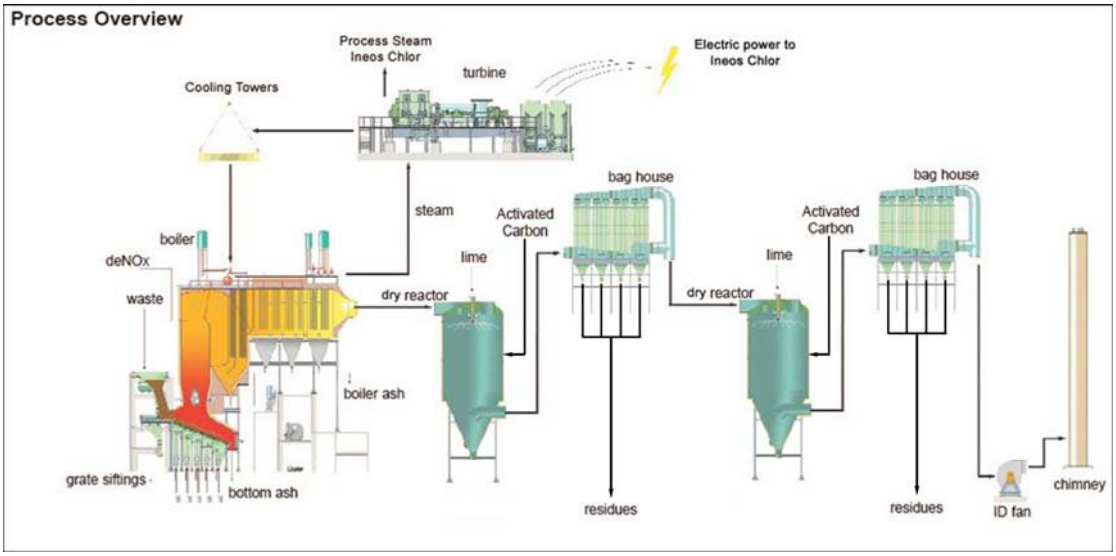
The orientation of the tipping hall is such that the main doors do not open towards Clarks Terrace but instead face Picow Farm Road, thus reducing the level of noise at Clarks Terrace from this source. Layout restrictions prevent an orientation where the entrance to the Tipping Hall faces away from Clarks Terrace. The tipping hall is designed to operate under a slight negative pressure as mitigation against possible odour and so does not have roof ventilation fans.

The induced draft (ID) fans are located on the northern part of the site and so are situated away from Clarks Terrace.

Further information on the site is addressed below at 4.2.

4.1.3 What the Installation does

This is an Installation for the incineration of waste for the purposes of generating energy.



The EfW facility will have a total capacity of approximately 350 MW (thermal) and will be capable of generating up to approximately 86MW of electrical power and 110 tonnes per hour of steam. Waste material to be burned at the proposed EfW facility will primarily be refuse derived fuel (RDF) and digestate produced from the Mechanical and Biological Treatment (MBT) of Municipal Solid Waste (MSW) but will also include some appropriately treated commercial and industrial (C&I) waste and waste biomass. All waste material for processing received at the facility will be non-hazardous.

The facility will consist of four lines with a total annual throughput of approximately 750,000 to 850,000 tonnes per year of waste materials with a design average net calorific value (NCV) of approximately 13MJ/kg. The facility will be developed in two phases, each consisting of two lines of capacity of 375,000-425,000 tonnes per year (depending on NCV). This permit covers the operation of both phases.

Waste materials will arrive either by rail or by road. All waste material will be weighed before proceeding into the tipping hall. Here the waste material will be tipped into the RDF bunker which will have capacity to store up to 7 days of waste inputs. The digestate fraction from the MBT will be handled in a smaller separate bunker, with a maximum capacity for 3.5 days supply.

Moving grate technology will be used for burning the waste material. The combustion stage will be controlled to ensure optimum destruction of pollutants and minimum waste generation. The furnace design will ensure sufficient temperature of at least 850°C and residence time of at least two seconds to promote complete combustion.

To ensure that the temperature does not fall below 850°C natural gas auxiliary fuel will be provided to ensure that the minimum temperature is maintained and will automatically be triggered by online process monitoring equipment.

Selective Non-Catalytic Reduction (SNCR), involving the injection of ammonia solution, controls the abatement of nitrogen oxides generated within the

furnace. Hot gases from the furnace will pass from the furnace into a boiler in which steam will be raised. Steam raised in the boiler will be passed to turbines to generate electricity. The ability to export electricity into the National Grid is also included within the design.

The boiler design has taken into consideration the need to achieve a high rate of combustion gas cooling and avoid *de novo* synthesis of dioxins and furans. Combustion gases will be passed through two banks of treatment and filtration equipment, before they are released to atmosphere. Treatment consists of the injection of dry lime to neutralise acid gas components (hydrogen chloride, oxides of sulphur, hydrogen fluoride) and activated carbon to absorb heavy metals, dioxins and furans. The resultant gases will then pass through a bag filter unit to remove particulates which are then collected ready for disposal. The treatment and filtration is repeated in a second bank of equipment to achieve a high degree of gas cleaning.

Cleaned flue gases exiting the abatement system will be discharged through a four-flue 105m stack.

A single process water discharge from the facility, primarily comprising the excess cooling water purge from the cooling towers combined with excess rainwater, will be via a new outfall point directly into the disused Runcorn & Weston Canal. The water quality will be such that it does not require treatment before discharge. There will be no direct discharges to groundwater from the EfW facility.

Bottom ash is intended to be recycled by the use of a specialist contactor. Disposal of the Air Pollution Control (APC) residues will be to landfill. INEOS will regularly review the disposal option for this residue and if a recycle route becomes viable then the residue will be diverted to this route.

All plant areas will be surfaced to an appropriate standard for the activities within that area. All liquid tanks and drums will be provided with adequate bunding in line with industry best practice standards (i.e. sized to contain 110% of the tank contents and include blind drains). Materials selected for surfacing of process areas and bunds will be resistant to the materials they may come into contact with.

Odour problems are not expected from the facility as the majority of the waste arriving on site is RDF and appropriately treated C&I material. This has a much lower potential for odours than raw municipal solid waste (MSW). There are odour control measures for delivery and storage of waste and any potential odours from storage of the waste materials will be extracted from above the storage bunker and used as combustion air within the furnace, thereby destroying any potentially odorous compounds. Digestate can be more odorous than the RDF fractions and in addition to the measures described above the digestate fraction bunker is designed for reduced storage times compared to the RDF.

A noise assessment has been carried out for the proposed EfW facility and confirms that the proposed facility is unlikely to give rise to nuisance or disturbance to local residents.

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

Waste throughput, Tonnes/line	850,000 tonnes/annum 212,500 tonnes/annum/line	106 tonnes/hour 26.5 tonnes/hour/line
Waste processed	Primarily refuse derived fuel (RDF) and digestate produced from the Mechanical and Biological Treatment (MBT) of Municipal Solid Waste (MSW) but it also includes some appropriately treated commercial and industrial (C&I) waste and waste biomass.	
Average net calorific value	13 MJ/kg	
Number of lines	4	
Furnace technology	Water Cooled Moving Grate	
Acid gas abatement	Double Dry	Hydrated lime
NOx abatement	SNCR	Ammonia
Reagent consumption	Ammonia solution: 3,600 te/annum Lime: 30,000 te/annum Activated carbon: 260 te/annum	
Flue gas recirculation	No	
Dioxin abatement	Activated carbon	
Particulates abatement	Bag filters	
Stack	Height, 105 m	Equivalent flue diameter of all 4 flues combined, 4.41 m
Flue gas	Flow, 229 Am^3/s (151 Nm^3/s)	Velocity, 15 m/s
Steam generation conditions	Temperature, 400°C	Pressure, 52 barg
Electricity generated (assuming 8000 hours operation / year)	Up to about 86 MWe	688,000 MWh
Electricity exported	Up to about 75 MWe	600,000 MWh
Recovered heat use	Steam used as energy in neighbouring Runcorn Halochemicals Installation: up to 110 tonnes/hour, 240^oC, 15 barg	

4.1.4 Key Issues in the Determination

The key issues arising during this determination were
- dispersion of emissions to air,
- noise,
- impacts on the local environment and conservation sites

and we therefore describe how we determined these issues in most detail in this document.

4.2 The site and its protection

4.2.1 Site setting, layout and history

The site setting and layout is described in section 4.1.2 above.

The history of this site as an industrial unit commenced in the late 19th century when the Weston Point Salt Works was established. Prior to this the area was pasture. As the sites here and in the nearby chemical works developed, housing in the neighbourhood increased and the railway network grew. The land remained part of the industrial complex over the next 100+ years and various tanks and buildings were installed as required for the demands of the time.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

Potentially polluting substances to ground and ground water and prevention measures are considered in the following table:

Substance	Prevention measures
Water run off and spillage from vehicle fuel bunker, fuel oil storage area, bottom ash bunker, chemicals storage area. Firewater arisings Flood water arisings	Physical measures: The whole plant is constructed on a hardstand of material of construction resistant or impervious to the substances being handled. There is no underground storage. All liquid storage areas are bunded with material of construction resistant or impervious to the substance being contained. Bunds are constructed to a capacity of at least 110% of the capacity of the largest tank in the bund and 25% of the combined capacity of all the tanks in the bund. Additional information supplied on 28 May 2010 describes the arrangements for fire fighting and contaminated water containment. The plant can contain up to 500m^3 contaminated firewater which is considered adequate for the type of fire that may be anticipated. The plant is not built in a flood risk area so flood water arisings are not anticipated. Localised flooding is avoided by using surfaces that promote rainwater run-off through the use of soft landscaping in non-plant areas. In plant, localised floodwater will collect in the bunds from where it can be pumped and stored in harvesting tanks for reuse. Management controls: Operators supervising material transfers are trained in the task. Containers are routinely inspected for damage or signs of deterioration. Material handling will take place in contained areas so that spillage is captured. All bunds are inspected daily to ensure they are kept empty. Water collection is used in the bottom ash quench system. During shutdown periods, bunkers are visually inspected to ensure continued good state of repair. Spill kits are available to contain and collect small spillage.

	Pre-operational condition PO07 requires that an emergency spill (including the handling of flood water arisings) management plan is produced.

We consider that with the management and physical measures available, the likelihood of incidents involving loss of containment is low and the overall risk to the environment is not significant. In particular we are satisfied that groundwater is protected from the activities of this installation.

4.2.3 Closure and decommissioning

Having considered the information submitted in the Application, we are satisfied that the appropriate measures will be in place for the closure and decommissioning of the Installation, as referred to in section 2.11 of the Application. Pre-operational condition PO05 requires the Operator to develop a site closure plan before the Installation is operational.

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

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation.

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

The incineration of waste is not a specified waste management activity. The Agency has considered whether any of the other activities taking place at the Installation are SWMAs and is satisfied that none is taking place.

We are satisfied that the Applicant's submitted OPRA profile is accurate.

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

4.3.2 Management

The Applicant has stated in the Application that they will implement an Environmental Management Systems that will be certified under ISO14001. The Agency recognises that certification of the EMS cannot take place until the Installation is operational. An improvement condition, IC6, is included requiring the Operator to report progress gaining accreditation of its EMS.

Having considered 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 personnel resources are available to the Operator to ensure compliance with all the Permit conditions.

4.3.3 Site security

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

4.3.4 Accident management

The Applicant has submitted an Accident Management Plan. Having considered the Plan and other information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are prevented but that, if they should occur, the consequences are minimised.

4.3.5 Off-site conditions

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

4.3.6 Operating techniques

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

Description	Parts Included	Justification
The Application	The operating techniques in Sections 1 (Introduction), 2 (Techniques for pollution control), 3 (Emissions) and 4 (Impact), of the Application document.	These sections contain all the information regarding the operating techniques for the plant
Response, dated 11 June 2010, to Schedule 5 Notice #4	Response to questions concerning ash handling	Some clarification was required concerning ash handling and its moisture control
Response, dated 13 August 2010, to Schedule 5 Notice #5	Response to questions regarding CEM arrangements to cope with abnormal operation and bag breakage detectors	Confirmation that there will be additional CEMs and a filter bag breakage detector

Response to emailed request for information dated 17/01/11	Response to questions about floodwater handling and range of operation	Confirmation of how the Operator will handle fire water arisings and what the lowest rate of operation will be.

The details set out above describe the techniques that will be used for the operation of the Installation that have been assessed by the Agency as BAT; they form part of the Permit through Permit condition 2.3 and Table S1.2 in the Permit Schedules.

We have not specified limits and controls on the use of the auxiliary fuel, natural gas, as it is already specified by the Gas Safety (Management) Regulations 1996, where natural gas should meet a total sulphur limit of 50 ppm (including H_2S).

Article 4(4) of the WID requires that the Permit must list explicitly the categories of waste which may be treated. The Application contains a list of those wastes coded by the European Waste Catalogue (EWC) number, which the Applicant believes may appear in the waste streams entering the plant and which the plant is capable of burning in an environmentally acceptable way. We have specified the permitted waste types, descriptions and where appropriate quantities which can be accepted at the Installation in Table S2.2.

We are satisfied that the Applicant can accept the wastes contained in Table S2.2 of the Permit because: -

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

We have limited the capacity of the Installation to 850,000 tonnes per annum. This is based on the Installation operating 8000 hours per year at a nominal capacity of about 106 tonnes per hour burning waste with a lowest expected net calorific value of 11.5 GJ/tonne.

It should be noted that treatment undergone before the waste arrives at the Installation includes the removal of recyclable material. In accordance with condition 2.3.3(c) separately collected fractions may only be accepted at the incinerator if it is contaminated and could only otherwise be sent to landfill. The residual waste arriving at the Installation is expected to have an average net CV of about 13 GJ/tonne.

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

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

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

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

2. The extent to which the Installation meets the requirements of Article 6(6) of the WID, which requires that heat "*shall be recovered as far as practicable*". This issue is covered in this section. It is important to understand, however, that the potential for using waste heat is largely determined by decisions taken by other bodies, such as planning decisions on the location of the Installation.

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

(ii) Use of energy within, and generated by, the Installation

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

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

1. maintenance and housekeeping procedures to ensure efficient operation
2. insulation to prevent losses
3. low energy requirement buildings (lighting, limited space heating)
4. energy management monitoring systems; energy management plan
5. the use of water cooled shell and tube condensers
6. the use of evaporative cooling tower because of its good cooling efficiency and low energy usage
7. the integration of furnace and boiler to maximise energy recovery
8. the use of two, two-stage steam turbines for the generation of electricity and successive let down of steam for use at the neighbouring chemical facility

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 156 kWh/tonne. The installation capacity is 850,000 t/a.

Data from the BREF for Municipal Waste Incinerators burning waste with a Net CV of 9.2 MJ/kg shows that the range of specific energy consumptions is as in the table below.

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

The average Net CV in this case is expected to be 13 MJ/kg. Taking account of the difference in CV, the specific energy consumption in the Application is in line with that set out above.

(iii) Compliance with Article 6(6) of the WID

The previous section describes our assessment of energy utilisation. Article 6(6) of the WID requires that heat "*shall be recovered as far as practicable*". The Government's guidance on the WID (WID EPR Guidance, October 2009) lists the following hierarchy of heat recovery options, with (e) as the least preferred option and the optimum being a combination of the other four options:

a) use of waste heat from boiler water cooling system

b) use of a boiler for steam generation or electricity generation

c) use of exhaust steam for process heating or CHP schemes

d) internal heat exchange for primary air heating and/or flue gas reheating

e) no heat recovery.

The Installation will primarily generate electricity, but will also provide waste heat in the form of steam for other processes and customers. The electrical output capacity of the plant will be about 86 MW with a steam export capacity of about 110 tonne/hour at 15 bar and 240^{o}C (equivalent to 88.7 MWh). The BREF note states that for a waste with NCV of 4.2 MWh/te (15.1 MJ/kg), it should be possible to recover 0.6-1.0 MWh/te of electricity. This plant will generate 0.81 MWh/te electricity which is towards the top of BREF range. Similarly, the BREF quotes a figure of 0.5-1.25 MWh/te for waste heat use and this plant will use 0.84 MWh/te waste which again is within the BREF range. The average NCV of the actual feedstock is 13 MJ/kg or 3.6 MWh/te and below the CV (4.2 MWh/te) on which the BREF ranges are based. With this in mind, the energy recovery at this plant compares very well with the BREF.

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.

We consider that the Installation will recover heat as far as practicable, and therefore that the requirements of Article 6(6) are met, insofar as the Agency's remit under the EPR is concerned.

(iv) Permit conditions concerning energy efficiency

The Operator is required to report energy usage and energy generated under condition 4.2 and Schedule 4 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 (if any). Together with the total waste burned per year, this will enable the Agency to monitor energy efficiency at the Installation and take action if at any stage the energy efficiency is not considered acceptable.

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

4.3.8 Efficient use of raw materials

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

The Operator is required to report with respect to raw material usage under condition 4.2 and Schedule 4, including the consumption of lime, activated carbon and ammonia used per tonne of waste burned. Improvement condition IC4 also requires that the details of the optimisation of the abatement systems during the plant commissioning are reported to us within 4 months of the completion of commissioning. 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 SNCR to abate NO_x. These are the most significant raw materials that will be used at the Installation, other than the waste feed itself (addressed in section 4.3.6, above). The efficiency of the use of auxiliary fuel will be tracked separately as part of the energy reporting requirement under condition 4.2.

Selection of principal raw materials

- *Lime*

There are a number of common alternative reagents which can be used for acid gas control; however, not all are suited for use within a dry system. Those reagents which can be used within a dry system are sodium bicarbonate or hydrated lime.

Hydrated lime is reported as providing better removal efficiencies compared to sodium bicarbonate. It also supports reaction temperatures which are compatible with use in a flue gas cleaning system which

includes bag filters, whilst efficient temperature ranges for sodium bicarbonate systems are towards the upper limit for use with bag filters.

Sodium bicarbonate has easier handling properties compared to hydrated lime which is corrosive. More significantly the use of sodium bicarbonate systems within large scale plant is not proven.

The Applicant has consequently selected hydrated lime as it is proven and well suited to operation with bag filters. We agree with this selection.

Lime is to be injected into the combustion gas stream in two stages. Each stage consists of a venturi reactor and a multi-compartment fabric filter unit. The first stage reactor has three injection points to promote good lime/gas mixing and the second stage has two points, with a third as a spare. On exit from each reactor the gases pass through a bag filter unit which removes lime along with any other particulates present in gas stream. In order to maximise the use of lime not fully reacted in the reactors the residues collected in the bag filters are recycled to the first stage reactor for re-injection. The optimum recycle rate will be determined during plant commissioning. Improvement condition IC4 requires the Operator to report on the optimisation of reagent consumption carried out during commissioning.

- *Activated carbon*

Powdered activated carbon is the most commonly used reagent for dioxin, furan and mercury control. The main alternative to the injection of activated carbon would be a catalytic system, however, whilst these systems destroy dioxins and furans they do not provide control of mercury and activated carbon injection would still be required. The choice of activated carbon is therefore the most efficient and we agree with the selection.

Activated carbon is injected into the two stages of venturi reactor using metering screw conveyors continuously run to ensure the correct dosage. The optimum dosing rate will be determined during plant commissioning. Improvement condition IC4 requires the Operator to report on the optimisation of reagent consumption carried out during commissioning.

- *Ammonia*

NOx control will utilise ammonia solution as the reagent. The main alternative to ammonia solution is urea. Whilst urea presents lower handling and storage hazards than ammonia, the reaction of urea gives rise to higher releases of nitrous oxides with corresponding global warming potential impacts. Consequently the decision is a balance between the inherent risks associated with ammonia versus the increased GWP impacts associated with urea. As the Applicant is experienced in the handling of hazardous materials the choice of ammonia solution was made. We agree with this selection.

There are two NO_x control measures: primary and secondary measures. The primary measures reduce the amount of NO_x formed during the combustion stage and consist of: optimising the primary and secondary air feeds to provide turbulence in the combustion chamber; ensuring the plant is as air tight as possible; controlling the combustion stage so that the combustion conditions remain optimum and; the use of low NO_x burners for auxiliary fuel firing.

The secondary measure reduces the amount of NO_x formed escaping into the environment. This is achieved by means of SNCR with ammonia as the reagent. In order to ensure effective NO_x control the design of the plant allows for: the optimal location of the ammonia injection points; wide ranging fine and even distribution of the ammonia in the gas exit from the combustion chamber; promotion of good mixing within the gas stream and; control of the rate of injection. The optimum dosing rate will be determined during plant commissioning and controlled during operation to avoid over dosing of ammonia thereby avoiding excessive loss to the environment. The dose rate will also be linked to the continuous NO_x monitoring. Improvement condition IC4 requires the Operator to report on the optimisation of reagent consumption carried out during commissioning.

- *Process water*

The principal water supplies to the facility will be from the following sources:

potable water
high grade water from the Runcorn Site
condensate waters from Salt Union
rain water collected from surface water run-off, roof water and perimeter drains

The primary uses of water by the plant are:

within the boilers for steam raising
cooling duties
bottom ash quenching
plant cleaning duties

The plant water systems have been designed to minimise fresh water consumption by the re-use of water within the process. A tank collects rainwater from building roofs, site surface drains and perimeter drains. This water is combined with the cooling water purge and discharged into the process water tank. The process water tank is used to supply water for boiler blowdown cooling. Water is also used for routine cleaning within process areas. Cleaning water from process areas has the potential for low level contamination as it may have been generated in areas handling oils, greases and other process chemicals. This water is collected within temporary storage sumps and is re-used for bottom ash quench. As described in section 4.2.2 above, the facility is designed to contain firewater.

- *Auxiliary fuel*

Natural gas is the auxiliary fuel, used to start up the incinerators and to ensure maintenance of combustion temperature. There is no superior alternative.

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

This IPPCD requirement addresses wastes produced at the Installation and does not apply to the waste being treated there. The principal waste streams the Installation will produce are bottom ash (which includes boiler ash) and air pollution control residues.

The first objective is to avoid producing waste at all. Waste production will be avoided by achieving a high degree of waste burnout 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 S3.5 specify limits for loss on ignition (LOI) in bottom ash of 5%. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

Most incinerator bottom ash (IBA) is likely to be classified as non-hazardous waste. However, IBA is classified on the European List of Wastes as a “mirror entry”, which means IBA is a hazardous waste if it possesses a hazardous property.

Air pollution control (APC) residues from flue gas treatment are hazardous waste and therefore must be sent for disposal either to a landfill site permitted to accept hazardous waste, or to an appropriately permitted facility for treatment. The Applicant proposes that initially the APC residues are disposed of to landfill until they can be characterised and assessed for alternative treatment or disposal. The Applicant has identified a potential treatment/ recovery route but samples of APC residues generated at this plant are required to accurately characterise the material for its suitability for treatment before this option can be developed.

In order to ensure that the IBA and APC residues are adequately characterised and sent to appropriate disposal or recovery facilities, pre-operational condition PO04 requires the Operator to provide a written plan for approval detailing the ash sampling protocols. Table S3.5 requires the Operator to carry out an ongoing programme of monitoring.

The Applicant also proposes that, where possible, bottom ash will be transported to a suitable recycling facility, from where it could be re-used in the construction industry as an aggregate. The Applicant is also investigating options for the use of bottom ash in road construction.

Having considered the information submitted in the Application, we are satisfied that waste production will be avoided as far as possible, and where

waste is produced it will be recovered unless technically and economically impossible.

We are satisfied that waste from the Installation that cannot be recovered will be disposed of using a method that avoids or reduces any impact on the environment. Standard condition 1.4.1 will ensure that this position is maintained.

5. Minimising the Installation's environmental impact

This section of the document explains how we have approached the critical issue of assessing the likely impact of the Installation on human health and the environment, and what measures we are requiring to ensure a high level of protection. For an installation of this kind, the principal emissions are those to air, although we also consider those to land and water.

5.1 Assessment Methodology

We have reviewed the Applicant's assessment of the likely environmental impact of emissions from the Installation. This is an important step in determining what conditions are appropriate for the Permit, and in particular the basis for setting emission limit values (ELVs).

The impact assessment has adopted the criteria set out in the Agency's Horizontal Guidance Note H1. The first step in this process is to screen out those emissions which are environmentally insignificant. H1 sets the following criteria:

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

The H1 methodology is based on the conservative approach, which adopts a "worst-case scenario" approach, as explained below. If, on this conservative basis, the emission's impact is assessed as "insignificant", then the Agency considers that the proposed technique for minimising pollution 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.

It is important to understand that an exceedence of these H1 thresholds does not mean an emission will have a **significant** impact, but only that it cannot be screened out as **insignificant**.

Where an emission cannot be screened out at this stage, a more detailed assessment should be carried out 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. The Applicant has in this case provided a detailed air dispersion model.

Where the modelling indicates that the emission is insignificant under the above criteria, and we agree with that assessment, we accept the Applicant's proposals without further justification, because it follows that any improvement that could be achieved by employing alternative techniques would also be insignificant.

For those pollutants where the $PEC_{long\ term}$ exceeds 70% of an EQS or the $PC_{short\ term}$ exceeds 20% of the headroom between an EQS and the background concentration, we determine whether we agree with the Applicant's conclusions with respect to whether exceedences of EQS are likely. This is done through detailed audit and review of the Applicant's impact assessment taking headroom and modelling uncertainties into account. Where exceedences are identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation in order to reduce releases from the Installation to ensure that there is no significant pollution or risk to human health. Whether or not exceedences are considered likely, the Application is subject to the requirement to operate in accordance with BAT.

Once the BAT for the Installation are established, we set ELVs based on use of those BAT. However, that is not the end of the exercise, because we also take into account local factors (for example, particularly sensitive receptors nearby such as a SSSI) and relevant Environmental Quality Standards (see further below). Again, even if we agree with the Applicant as to what is BAT, these additional factors may lead us to include more stringent conditions than those proposed by the Applicant. If we consider that emissions would cause significant pollution, we would refuse the Application.

WID on the other hand is based on setting mandatory emission limit values. Although the WID limits are designed to be stringent, and to provide a high level of environmental protection, they do not necessarily reflect what can be achieved by new plant. As the WID itself states, its limits are "*a necessary but not sufficient condition*" for compliance with the requirements of the IPPCD, which also applies to this Installation. The IPPCD requires that emissions should be prevented or minimised, so it may be possible and desirable to achieve emissions below WID limits.

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

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

5.2 Air Quality Assessment

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 both the ADMS 3.3 and AERMOD dispersion models, which are the accepted best practice computer models. The models used 5 years of meteorological data collected from Liverpool John Lennon Airport meteorological station, approximately 6.5 km West of the EfW site. As this site does not collect precipitation data, another site at Crosby, 27 km West of the proposed facility, was used as a surrogate for this data.

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 meteorological data.

The air impact assessments, and the dispersion modelling upon which they were based, employ assumptions:

- First, they assumed that the ELVs in the Permit would be those in the WID.
- Second and conservatively, they assumed that the Installation operates continuously at the short-term and long-term WID emission limit values, i.e. the maximum permitted emissions under the WID.

The way in which the Applicant used dispersion models, its selection of input data, and the assumptions it made have been reviewed by the Agency's specialist AQMAU, so that we satisfied ourselves with the robustness of the Applicant's conclusion, that the predicted concentrations of all pollutants do not result in exceedences of EQS. AQMAU also audited the air quality and human health impact assessment and agreed that the conclusions drawn in the reports were acceptable.

The results of the Applicant's model are summarised in the tables below:

5.2.1 Long-term impact of emissions to air

Pollutant [2]	EQS / EAL [1] [3]	Back-ground Conc. [1]	Process Contribution (PC) [1]	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) [1]	PEC as % EQS / EAL
PM_{10}	40	25.6	0.1	0.25	25.7	64.2
HCl	20	0.55	0.1	0.5	0.6	3.2
HF	250	4.92	0.3	0.1	5.2	2.1
SO_2	50	20	0.5	1.0	20.5	41.0
NO_2	40	26	1.4	3.5	27.4	68.5
CO	10000	480	9.3	0.1	489.3	4.9
Cd	0.005	$3.0x10^{-4}$	$2.2x10^{-4}$	4.5	$5.2x10^{-4}$	10.5
Tl	1	N/A	$2.2x10^{-4}$	0.02	$2.2x10^{-4}$	0.0
Hg	0.25	$2.0x10^{-3}$	$4.6x10^{-4}$	0.18	$2.5x10^{-3}$	1.0

Sb	5	$2.2x10^{-4}$	$4.9x10^{-4}$	0.01	$7.1x10^{-4}$	0.0
As	0.2	$7.0x10^{-4}$	$4.9x10^{-4}$	0.25	$1.2x10^{-3}$	0.6
Cr	0.1	$1.1x10^{-3}$	$4.9x10^{-4}$	0.49	$1.6x10^{-3}$	1.6
Co	0.2	$1.6x10^{-4}$	$4.9x10^{-4}$	0.25	$6.5x10^{-4}$	0.3
Cu	2	$9.2x10^{-3}$	$4.9x10^{-4}$	0.02	$9.7x10^{-3}$	0.5
Pb	0.5	$1.4x10^{-2}$	$4.9x10^{-4}$	0.1	$1.4x10^{-2}$	2.9
Mn	1	$3.3x10^{-3}$	$4.9x10^{-4}$	0.05	$3.8x10^{-3}$	0.4
Ni	1	$2.3x10^{-3}$	$4.9x10^{-4}$	0.05	$2.8x10^{-3}$	0.3
V	5	$3.5x10^{-3}$	$4.9x10^{-4}$	0.01	$4.0x10^{-3}$	0.1

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

Note [2]: Only those pollutants that have assigned EALs are considered

Note [3]: The Applicant correctly used EALs for metals (Tl, As, Cr, Co, Cu, Mn, Ni) and HF that were specified in the version of H1 that was available at the time of the Application. The EALs have subsequently been changed; our assessment below uses the EALs specified in the later version of H1.

5.2.2 Short-term impact of emissions to air

Pollutant [2]	EQS / EAL [1] [3]	Back-ground Conc. [1]	Process Contribution (PC) [1]	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) [1] [4]	PEC as % EQS / EAL
PM_{10}	50 [5]	25.6	0.3	0.6	25.9	51.8
	50 [6]	25.6	0.5	1.0	26.1	52.2
HCl	800	1.1	16.0	2.0	17.1	2.1
HF	250	4.92	1.1	0.4	6.0	2.4
SO_2	266 [7]	40	41.5	15.6	81.5	30.6
	350 [8]	40	33.9	9.7	73.9	21.1
NO_2	200	52	26.5	13.2	78.5	39.2
Cd	1.5	$6.0x10^{-4}$	$6.3x10^{-3}$	0.4	$6.9x10^{-3}$	0.5
Tl	30	N/A	$6.3x10^{-3}$	0.02	$6.3x10^{-3}$	0.0
Hg	7.5	$4.0x10^{-3}$	$1.3x10^{-2}$	0.18	$1.7x10^{-2}$	0.2
Sb	150	$4.4x10^{-4}$	$1.4x10^{-2}$	0.01	$1.4x10^{-2}$	0.0
As	15	$1.4x10^{-3}$	$1.4x10^{-2}$	0.09	$1.5x10^{-2}$	0.1
Cr	3	$2.2x10^{-3}$	$1.4x10^{-2}$	0.46	$1.6x10^{-2}$	0.5
Co	6	$3.2x10^{-4}$	$1.4x10^{-2}$	0.23	$1.4x10^{-2}$	0.2
Cu	60	$1.8x10^{-2}$	$1.4x10^{-2}$	0.02	$3.2x10^{-2}$	0.1
Mn	1500	$6.6x10^{-3}$	$1.4x10^{-2}$	0.00	$2.0x10^{-2}$	0.0
Ni	30	$4.6x10^{-3}$	$1.4x10^{-2}$	0.05	$1.8x10^{-2}$	0.1
V	1	$7.0x10^{-3}$	$1.4x10^{-2}$	1.38	$2.1x10^{-2}$	2.1

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

Note [2]: Only those pollutants that have assigned EALs are considered

Note [3]: The Applicant correctly used EALs for gases (HCl, HF) that were specified in the version of H1 that was available at the time of the Application. The EALs have subsequently been changed; our assessment below uses the EALs specified in the later version of H1.

Note [4]: For the assessment of short term impacts the PEC is determined by adding twice the long term background concentration to the short term process contribution.

Notes [5] and [6]: Averaging period - 24 hour (90th percentile) and 24 hour (98th percentile) respectively

Notes [7] and [8]: Averaging period - 15 minute and 1 hour respectively

From the two tables above the Applicant has screened out as insignificant, where the process contribution is <1% of the long term EQS/EAL or <10% of the short term EQS/EAL, all but the following emissions: SO_2, NO_2 and Cd (for long term emissions) and SO_2 (15 minute) and NO_2 (for short term emissions).

Also from the tables above, the Applicant has identified that none of the emissions are significant in that they do not exceed the H1 detailed modelling criteria (PEC exceeds 70% of the long term EQS/EAL or the PC exceeds 20% of the short term EQS/EAL headroom).

Note than in many cases, the Applicant has used old EQS values from previous versions of H1. AQMAU has checked the screening assessment using the up-to-date EQS values and concludes that we agree with the screening outcome with the exception of chromium, arsenic and nickel. AQMAU undertook a detailed audit of the Applicant's modelling assessment and we agree with the Applicant's conclusions that for those non-insignificant pollutants (taking modelling uncertainties into account) exceedences of EQSs are not likely. We have commented on the impacts of chromium, arsenic and nickel in Section 5.2.4 below.

For all non-insignificant emissions, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the Best Available Techniques to prevent and minimise emissions of these substances. This is reported in section 6 of this document.

5.2.3 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 EQS 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 $PM_{2.5}$, EQS is 25 $\mu g/m^3$ as a long term annual average to be achieved by 2010 (as a Target Value and by 2015 as a Limit Value).

The impact of the Installation against these standards and guidelines is shown in the table below. 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 / EAL [1]	Back-ground Conc. [1]	Process Contribution (PC) [1]	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) [1]	PEC as % EQS / EAL
PM_{10}	40 (LT)	25.6	0.1	0.2	25.7	64.2
	50 (ST)	25.6	0.5	1.0	26.1	52.2
$PM_{2.5}$	25 (LT)	9.98	0.1	0.4	10.08	40.3

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

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

- It assumes that the plant emits particulates continuously at the WID limit. Actual emissions from similar plant are normally lower than this to accommodate natural fluctuations in operation whilst maintaining an emission level consistently below the WID limit.
- 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 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 shows that the predicted process contribution for emissions of $PM_{2.5}$ is below 1% of the EAL and therefore considered insignificant.

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 ($PM_{2.5}$) for inclusion in a measurement of total particulate matter, a permit 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 IC1 has been imposed requiring the Operator to carry out tests to determine the particle size distribution in the exhaust gas emissions.

5.2.4 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 minimum 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.

Air Dispersion Modelling in the Application makes the conservative assumption that emissions of particulate matter and each individual metal occur at the WID aggregate limits. It is possible that such an analysis may indicate a theoretical risk that the revised EALs may be exceeded.

The Agency has considered whether a less conservative approach would be valid.

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 value 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 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 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. We have also attained particle emission data for arsenic and nickel. These data show:

Measurement	**Mean**	**Minimum**	**Maximum**
Proportion of Cr(VI) to total Cr in APC residues (as %)	0.7	0.03	2.1
Chromium emission concentration (mg/m^3) [1]	0.007	0.001	0.033
Arsenic emission concentration (mg/m^3) [1]	0.0013	0.0003	0.003
Nickel emission concentration (mg/m^3) [1]	0.018	0.002	0.132

Note [1] in stack measurement as concentration of particle fraction in stack gases

Based on these data, we consider it remains a conservative assumption to consider that the maximum Cr(VI) emission concentration will be 1.3 x 10^{-4} mg/m^3 (taken from the worst results that combined to give the summary in the above table). We have used this data to model the predicted Cr(VI) impact.

The table below shows the Applicant's assessment against revised EALs (ie the EPAQS guidelines):

	EAL µg/m^3	PC µg/m^3	PC % EAL	PEC µg/m^3	PEC % EAL
Arsenic	3.0 x 10^{-3}	2.2 x 10^{-4}	7.3	9.2 x 10^{-4}	31
Nickel	2.0 x 10^{-2}	1.1 x 10^{-3}	5.5	3.4 x 10^{-3}	17
Chromium (VI)	2.0 x 10^{-4}	2.2 x 10^{-4}	109	4.4 x 10^{-4}	219

However the Cr(VI) predictions are very much worst case assumptions and unlikely to be representative of actual emissions.

The table below shows Agency assessment using the data collected from the municipal incinerator sampling, referred to above.

	EAL µg/m^3	PC µg/m^3	PC % EAL	PEC µg/m^3	PEC % EAL
Arsenic	3.0×10^{-3}	2.6×10^{-5}	0.9	8.5×10^{-4}	28
Nickel	2.0×10^{-2}	1.3×10^{-3}	6.5	3.6×10^{-3}	18
Chromium (VI)	2.0×10^{-4}	1.2×10^{-6}	0.6	NA [1]	NA [1]

Note [1] there is no available information regarding Cr(VI) ambient concentration

This assessment shows that based on expected realistic emissions, a breach of the air quality guidelines for Arsenic, Nickel and Chromium (VI) is unlikely.

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 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.

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

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, Nickel or Chromium as appropriate or seek beyond BAT improvements to the abatement technology employed.

5.3 Human health risk assessment

In carrying out air dispersion modelling and comparing the predicted environmental concentrations with air quality standards and environmental action levels, the Applicant has effectively made a health risk assessment for many pollutants. Air quality standards and environmental actions levels have been developed primarily in order to protect human health, and for many pollutants exposure by inhalation is the principal exposure route. In the following discussion, the Applicant correctly used EALs that were specified in the version of H1 that was available at the time of the Application. The EALs have subsequently been changed and our assessment uses the EALs specified in the later version of H1.

The Applicant's assessment of the impact from PM_{10}, HCl, HF, CO, Tl, Hg, Sb, As, Cr, Co, Cu, Pb, Mn, Ni and V (tables in 5.2.1 and 5.2.2 above) have all indicated that the Installation emissions are insignificant. Where the impact

of emissions of SO_2, NO_2 and Cd (for long term emissions) and SO_2 (15 minute) and NO_2 (for short term emissions) have not been screened out as insignificant, the assessment still shows that the predicted environmental concentrations are well within air quality standards or environmental action levels.

For all metals with the exception of antimony and thallium, the EALs are more sensitive than their respective reference doses and therefore comparisons with their EALs are protective of human health without the need for food chain analysis. (Reference dose is a USEPA criterion for describing a threshold pollutant intake for a human; units are usually expressed in terms of a mass intake per kilo body mass per day.)

For antimony and thallium we agree with the Applicant that the emissions are not likely to exceed the reference doses and therefore PCs are likely to be not significant.

However for dioxins, furans and some metals, the principal exposure route is through ingestion, usually through the food chain, and the risk to health is through accumulation in the body over a period of time. A different form of risk assessment is therefore required for these materials.

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

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

5.3.1 Assessment of Health Effects from Dioxins and Furans

The Applicant has assessed the potential health impacts of the predicted emissions of metals from the proposed facility, along with emissions of dioxins and furans,

As part of the health risk assessment the daily intake of dioxins and furans by local receptors resulting from the operation of the proposed facility was assessed against the Tolerable Daily Intake (TDI) values for dioxins and furans established by the UK Committee on Toxicity (COT). The TDI is the amount of a substance that can be ingested daily over a lifetime without appreciable health risk. It is expressed in relation to bodyweight in order allow for different body size, such as for children of different ages. In the UK, the

Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (known as the COT) has set a TDI of 2 picograms I-TEQ (equivalent to the most toxic dioxin) per kg bodyweight per day.

The results of the assessment of dioxin intake are detailed in the table below. (worst case results for each category are shown). The results show that the predicted daily intake of dioxins at all receptors, resulting from emissions from the proposed facility, are significantly below the recommended TDI levels for dioxins of 2 pg/kg-bw/day.

Category	Receptor	Worst case daily intake
Farmer	RCPTR-5 (Hale Gate Farm)	0.0655 pg/kg-bw/day
Resident	RCPTR-10 (Pewithal Primary School)	0.0157 pg/kg-bw/day

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

Further, when the comments made in section 5.3.2.1 below, about the likely over-estimation of results by the Applicant, we consider that the predicted intake is at least 10 times lower than that indicated in this table.

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

5.3.2 Environment Agency Review of Health Risk Assessment

The Agency has reviewed the methodology employed by the Applicant to carry out the health impact assessment from persistent substances.

The Applicant submitted a revised Human Health Risk Assessment where they predict that neither the Committee for Toxicity Tolerable Daily Intake (COT-TDI) dioxins and furans nor the USEPA reference doses for heavy metals are likely to be exceeded. We have carried out check modelling using both the United States Environmental Protection Agency (USEPA) Human Health Risk Assessment Protocol (HHRAP) method and Her Majesty's Inspectorate of Pollution (HMIP) 1996 method and conclude that the impact is not likely to be any higher than that predicted by the Applicant. The Applicant has re-assessed the impact of proposed emissions using the COMEAP methodology as requested. The Applicant concluded that potential changes in pollutant exposure will not be of a level to result in any measurable health outcome. Our check modelling and calculations agrees with the Applicant.

The Agency is therefore satisfied that the Applicant's conclusions presented above are soundly based and that the potential emissions of dioxins, furans and metals from the proposed facility are unlikely to have an impact upon human health.

5.3.2.1 Consultation on health risk assessment

Health Protection Agency and Halton and St Helens Primary Care Trust
The Health Protection Agency and the Halton and St Helens Primary Care Trust were consulted on the 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.

Details of the responses provided by the PCT and HPA to the consultation on this Application can be found in Annex 4.

Food Standards Agency (1): Predicted dioxin and furan human intake compared to the COT-TDI considering potentially high background dioxin intake.
The Food Standards Agency were also consulted and they indicated some concerns that required further assessment and provision of information.

FSA was concerned that the Applicant's dioxin impact assessment does not adequately take background intake into account. FSA stated that the predicted maximum process contribution (PC) of 8% of the COT-TDI might be considered significant if the background dioxin intake is found to be high "in view of the industrial nature and history of the area".

In view of the FSA's concern we considered it important to determine whether the predicted impact was indeed realistic or whether an alternative impact should be used to provide a more realistic assessment. Having previously identified that the PC is not likely to exceed 8% of the TDI, we reviewed the HHRA in order to establish the extent of any conservative assumptions made by the Applicant. In doing so, we carried out our own empirical calculations using the USEPA HHRAP and the HMIP methodology. Both sets of guidance contain a series of equations and reference standards. Using dioxin concentrations predicted from air dispersion modelling, the equations can be used to calculate the dioxin intake into the human body. They take account of intake through multiple pathways in addition to air such as through milk, eggs, various meat products, fish and drinking water.

The Applicant used the proprietary modelling software known as IRAP-H to make their predictions. We reviewed their model input files and established that the deposition rates used in the model were extremely precautionary and unrealistic for this type of emission. The Applicant predicted intake at a range of receptor locations. The value for receptor 5 (Hale Gate Farm) of 0.1 m/s is 10 times higher than the velocity we use for screening in H1 (0.01 m/s) and 100 times greater than the values suggested by the HMIP report. The H1 value of 0.01 m/s is itself reasonably precautionary with respect to particles of the size expected to be released from bag-filters (mainly PM_{10}). The higher value used by the Applicant would propagate proportionately through the intake calculations resulting in a significant positive bias by at least ten times relative to expected values.

Taking the above observations into account in our check calculations (based on the Applicant's modelling and our own audit modelling checks), we are satisfied that the contributions are likely to be less than 1% of the COT-TDI in Runcorn or farm locations adjacent to the town.

The Applicant's HHRA and our check calculations are based on an assumed dioxin emission rate from the plant at the WID Emission Limit Value of 0.1 ng(TEQ)/m^3 for 100% of the time. In practice this is not likely. Analysis of our own compliance check monitoring results from incineration plant indicates that dioxin and furan emissions rarely exceed 20% of the WID ELV. It is also important to note that the HHRAP and HMIP equations contain extremely conservative assumptions about dietary intake and that intake is sourced from the location of peak impact from the proposed plant.

We advised FSA that the PC is likely to be less than 0.4% of the TDI (0.008 pg WHO/TEQ per kg(BW)/day. In further correspondence, FSA confirmed that at this level, as a worst case, the contribution would reasonably be regarded as insignificant.

With a background of 45% of the TDI (ie 0.9 pg/kg bw/day; see section 5.3.1) a PC of <1% is not likely to lead to exceedences. The FSA has no evidence to suggest the local background in Runcorn is higher than the indicative UK background. The basic principle of our assessment methodologies are that for the worst case scenario with a PC of <1%, even if the background is found to be high (and there is no evidence to suggest this), then the PC is not likely to significantly contribute to it.

It is not the intention to reduce the ELV for dioxins in this permit on the basis of the performance demonstrated by other incinerators. Plant process conditions fluctuate naturally and continuously and emission levels fluctuate as a consequence. The ELV has been set at a level to ensure that there is no harm to the environment and it allows for a certain amount of process variation without causing the limit to be breached. As the predicted impact of releases at the ELV is regarded as insignificant, any further reduction of the ELV would still be insignificant. In any event we will keep ELVs under review.

Food Standards Agency (2): Model validation
However, FSA raised additional concerns:

- The HHRAP model (used by the Applicant) is based on a hypothetical model that is not fully validated.
- The model predicts eventual human exposure but no intermediate information is provided, such as incremental additional levels of contaminants in local food animals and food products

We agree that the HHRAP equations are not fully validated in terms of comparing predictions with actual human intake values. The input parameters and chemical data, however are validated and the algorithms are based on sound scientific principles. The USEPA website contains a response to public questions on this issue.

In response to the public comment "*The methodology relies on correlation algorithms that are very poorly validated for the range of chemicals included in the guidance*.", the USEPA responded "*We agree that some of the correlation algorithms are poorly validated for a few chemicals, and we are currently updating these correlations. However, algorithms in the guidance are based on the best available science currently available and except for a few instances, provide a reasonable estimate of exposure."*

In the absence of a fully validated system, the equations should be viewed as a best-available predictive model.

Our consideration of the contribution to dioxin and furan contamination of food products is shown in Food Standards Agency (4) below.

Food Standards Agency (3): Dioxins and furans potentially entering the food chain at Frodsham Score

A specific question relating to the potential for dioxin emissions entering the food chain at grazing land to the west of Runcorn known as Frodsham Score was asked by FSA. The Applicant's HHRA focuses mainly on a number of farms as sensitive receptors, including several in the Hale area to the northwest. They did not explicitly make predictions assuming food contamination due to dioxin and furan deposition at Frodsham Score.

The Applicant identified the Hale Gate Farm as the highest risk farm receptor. Our check modelling confirms this. We established that the peak annual concentrations at Frodsham Score is likely to be no more than 20% the values predicted at Hale Gate Farm and 10% compared to residential receptors in Runcorn. As the predicted concentrations are lower than those for residential receptors in Runcorn and farm receptors at Hale Gate Farm, the assessments carried out by the Applicant should be considered protective of intake at Frodsham Score, i.e. considerably less than 1% of the COT-TDI.

Food Standards Agency (4): The contribution of dioxins and furans to food contamination thresholds

As referred to above, FSA raised their concern that although the Applicant's HHRA predicts impacts due to eventual human exposure, intermediate information is not provided to enable it to determine whether incremental additional levels of contaminants in local food animals and food products are of concern. FSA provided references to the EC Regulation 1881/2006 and EC Recommendations 2006/88/EC for food contamination.

Although the Applicant did not present the predicted contamination in food products, the HHRAP algorithms calculate product contamination as an interim stage.

We carried out our own check calculations in order to establish whether the predicted risk is sufficient to require the Applicant to extract this data from their own models in support of their Application. We took this approach because the Applicant has provided an overly conservative assessment due

to unrealistic particle deposition velocities and using their model might not provide "reasonably precautionary predictions" at this stage.

To provide an indication of the likely worst-case process contributions (PC) therefore to food contamination, we have calculated the PC as follows:

Product	EC Regulation pg/g	PC as % of EC Regulation	EC Recommendation pg/g	PC as % of EC Recommendation
Beef	3	<0.1%	1.5	<0.1%
Milk	3	<0.1%	2	<0.1%
Pork	1	<0.1%	0.6	<0.1%
Eggs	3	<0.2%	2	<0.3%
Poultry	2	<0.1%	1.5	<0.3%
Fish	4	<0.1%	3	<0.1%

We have made these predictions at the most sensitive receptor to human uptake; Hale Gate Farm. This location can reasonably be considered to present a worst case scenario for dioxins to potentially enter the food chain although we do not know whether the farm is a supplier of any/all of the above products. The predictions should be considered as indicative only. They have been presented as less than values due to the conservative nature of the assumptions and the screening approach used.

From these calculations using HHRAP equations, we conclude that assessed against either EC Recommendation or EC Regulation the impact is insignificant. Furthermore, the percentage PC is the same order of magnitude as the predicted PC for total human uptake as a percentage of the COT-TDI. This indicates that an assessment against the TDI can be systematically considered as protective of the product contamination thresholds.

The Environment Agency consulted FSA on the indicative assessment values in the table above. In response to this FSA stated “the values appear to be very low, which should mean they are not a concern.”

<u>Food Standards Agency (5): Supplementary Questions</u>
FSA went on to ask:

- Whether the data is expressed on a daily basis.
- With respect to meat products, how bioaccumulation is taken into account.

FSA stated “there should be no concern for milk and eggs as they provide an excretion route”.

We responded to state that data relates to predicted concentrations of dioxins in produce (e.g. beef) as a result of consuming plant feeds and soil derived from and contaminated locally from dioxin deposition. The predictions are dependant on biotransfer factors from soil and feedstuffs quoted in kg/day.

In the case of meat products, bioaccumulation is taken into account in the model by calculating the human intake from the contaminated produce (e.g. beef). This is done be applying Animal Tissue Ingestion Rates (based on a US Diet) in kg/day. These totals are then multiplied by exposure constants defined in the HHRAP guidance to calculate lifetime exposure and presumably considering bioaccumulation. The results of this calculation can then be compared with the TDI for lifetime exposure. Note that the issue of overall body exposure is covered in sections Food Standards Agency (1), (2) and (3) above, and the FSA referred to likely values of less than 1% of the TDI as "insignificant".

5.3.3 Other Health Considerations

In September 2009 the HPA produced a position statement entitled “The Impact on Health of Emissions to Air from Municipal Waste Incinerators”. This was then reproduced in February 2010 as an advisory document RPE-13. Their comments can be 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.

5.3.4 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 0.3µm, 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 are considered to refer to those particulates less than 0.1µm 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 HPA addresses the issue of the health effects of particulates in their September 2009 statement 'The Impact on Health of Emissions to Air from Municipal Incinerators'. It refers to the coefficients linking PM_{10} and $PM_{2.5}$ with effects on health derived by the Committee on the Medical Effects of Air Pollutants (COMEAP) and goes on to say that if these coefficients are applied to small increases in concentrations of particles 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 exceeds $PM_{0.1}$. This is borne out by the assessment of this Application which show emissions of PM_{10} to be insignificant

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

The way in which the Applicant used dispersion models, its selection of input data, and the assumptions it made have been reviewed by the Agency, so that we satisfied ourselves that the modelling presented a reasonably reliable picture. In addition, the Applicant's habitats assessment was reviewed by the Agency's technical specialist for conservation and ecology technical services, who agreed with the assessment's conclusions, that the impact of the Installation's emissions upon local Ramsar sites and SSSIs would be insignificant.

The following table shows the conservation sites identified within the distances of consideration:

Designation	**Site**	**Distance of consideration**
(Habitat) Ramsar	Mersey Estuary	10 km
(Habitat) SPA		

SSSI	Mersey Estuary	2 km
Local Nature Reserves	Pickerings Pasture	
	Runcorn Hill	
Local Wildlife Sites	Frodsham and Helsby and Ince Marshes	
	Pickerings Pasture	
	Runcorn Hill	

Each of the designations and sites is considered in more detail below:

Habitats site

In respect of the Ramsar and SPA Habitats site within 10 km of the facility, our assessment was summarised in the Form HR01 and placed on the public register. It was submitted to Natural England for consultation who agreed with our conclusions that the impact of the Installation's emissions upon local Ramsar and SPA site would have no likely significant effect.

The aspects examined for the assessment were acidification (acid gas emissions); nutrient enrichment (nitrogen loading on the environment); toxic contamination (SO_2 and NO_x effects); hydrogen fluoride.

Acidification: The Site Based Critical Load Database on APIS was reviewed to obtain species based critical loads for the Mersey Estuary and it stated that there are no species likely to be affected by acidification. It is therefore possible to conclude no likely significant effect from acidification alone and in-combination.

Nutrient enrichment: APIS was reviewed and the following species are considered to be sensitive to nutrient enrichment: Great crested grebe, Eurasian wigeon, European golden plover, Black-tailed godwit and Eurasian curlew. The appropriate critical load range is given as 30-40 kg N/ha/yr. Deposition of nutrient-N from the process is predicted to be, on average 0.018 kg N/ha/yr, with a maximum of 0.169 kg N/ha/yr:

Process Contribution kg N/ha/yr	Critical Load Kg N/ha/yr	PC as percentage of Critical Load	Significant?
0.018 – 0.169	30	0.06 – 0.56	No

Toxic contamination: Modelling submitted by the Applicant has predicted that the emissions, on a long term basis, are all less than 1% of the relevant critical level (for the protection of vegetation and ecosystem) and are therefore considered insignificant.

	PC µg/m^3	PC % of threshold Level	Significant?
Ground level concentration over whole site			
NO_x LT	0.12	0.4	No (<1% of threshold for long term; <10% of threshold for short term)
NO_x ST	13.3	6.6	
SO_2 LT	0.03	0.2	
SO_2 ST	8.5	2.4	

Hydrogen fluoride (HF): HF is highly reactive and only persists in the atmosphere for short periods before being converted to other fluorides. This means that atmospheric HF is generally restricted to the immediate vicinity of the source of emissions. HF is absorbed by plants at a greater rate than other gaseous pollutants owing to its low molecular weight and its high solubility in water. Limits for HF are often set for short averaging periods to protect against the effects of acute exposures. Modelling has been carried out to calculate the PC for HF for averaging periods of one day (EAL 5 µg/m^3), one week (EAL 0.5 µg/m^3) and one month (EAL 0.2 µg/m^3) to allow comparison with the EALs and APIS. The PCs for each of the relevant averaging periods are provided in the following table which shows that the predicted PC at all locations within the identified designated sites is below 10% of the EAL relevant to each averaging period and so there will be no likely significant effect.

Ecological Site	Designation	Max PC (µg/m^3)	EAL (µg/m^3)	PC as % of EAL	PC <10% EAL?	Screen Out
Mersey Estuary	SSSI, Ramsar, SPA	4.82×10^{-2}	5 (day)	0.96	Yes	Yes
		1.49×10^{-2}	0.5 (week)	2.98	Yes	Yes
		4.43×10^{-3}	0.2 (month)	2.22	Yes	Yes

SSSI

In respect of the Mersey Estuary SSSI, which lies within 2 km of the facility, our assessment was summarised in the CRoW Act Appendix 4 Form and placed on the public register. The assessment featured the same aspects, as discussed above for the Habitats site of the Mersey Estuary. Our conclusion was that the impact of the Installation's emissions upon the SSSI would not damage its special features which consist of a site for wildfowl with large areas of intertidal sand and mudflats. Natural England were notified of this outcome, but there was no requirement for them to be consulted.

Non-statutory conservation sites

There are other non-statutory conservation sites within 2 km of the facility. These sites were identified as Runcorn Hill, Pickerings Pasture, Weston Marsh Lagoon and Frodsham, Helsby and Ince Marshes.

As there are no specific regulations for the protection of these sites (beyond our requirements to enhance biodiversity under the Natural Environment and Rural Communities Act 2006 and our wider conservation duties under the

Environment Act), we are required to ensure that the permitting of the Installation will not result in significant pollution.

Runcorn Hill Local Nature Reserve (LNR) is the most affected. The following table shows the relevant information:

	Max deposition rate (PC) [1]	Critical load (CL) [1]	PC as % of CL	Background [1]	PC as % of Background	PEC [1]
Acid deposition	0.07	0.35	19.1	1.48	4.5	1.55
Nitrogen deposition	0.225	10	2.2	18.6	1.2	18.8

Note [1]: units: keq/ha/yr

As the table describes, the background acid and nitrogen deposition rates are above the respective critical loads and inevitably this means that the PEC for the process will be above 100%. The Agency considers that given the size of the PC, particularly when considered against existing background levels and as there is no physical evidence to suggest otherwise, the impact on the site is not likely to cause significant pollution. As the impact assessment was based on emissions at the WID limits rather than at expected, lower, emission levels it is likely that the actual impact will be lower. The local authority responsible for the upkeep of the Runcorn Hill LNR did not indicate the LNR was being damaged by the high background levels.

Impact of dioxins, dioxin-like substances, heavy metals and PCBs on estuarine silt.

In a further response by Natural England, they expressed their concern that the deposition of dioxins, heavy metals and PCBs from the proposed incinerator may add to the existing load in the Mersey estuary.

Natural England indicated that heavy metals, dioxins and PCBs do not have critical loads in the environment. The Environment Agency and Natural England have agreed that deposition should be compared against the Canadian sediment quality guidelines[1]. The reference threshold limit for dioxins is given as 0.85 ng/kg and the probable effect level as 21.5 ng/kg. Results of the closest and most recent sediment sampling are available for the mouth of the Mersey estuary, over 20 km from the incinerator. Samples taken in 2004 indicate that dioxin levels in sediment are between 8.7 and 40 ng/kg. Samples taken in 2001 indicate that PCB levels in sediment were 15 ng/kg.

The Applicant did not explicitly cover this issue in their Habitats impact assessment. We reviewed the Applicant's data and carried out indicative checks to establish whether or not the issue raised is a significant risk. We used the HHRAP algorithms to calculate the amount of deposited dioxins, furans and heavy metals on the inter-tidal zone of the Mersey Estuary. We

[1] Canadian Sediment Quality Guidelines for the protection of aquatic life: Canadian Council of Ministers 2001

based our calculations on the maximum predicted concentration on the Mersey and the conservative deposition rate used in the HMIP 1996 report[2].

We assumed the plant operates at the WID dioxin ELV at full plant capacity for the whole of a year. For most metals, the WID sets aggregate ELVs; for example, 0.5 mg/m^3 for a group of nine metals including arsenic, lead and chromium. For these metals we have extracted emissions data from a group of ten incinerators over the past 2 years (see our guidance[3]). We conservatively used the highest value for each of these measurements. The assessment assumes that the proportion washed off into the river is the same as would be expected from rainfall on farmland. This is a conservative assumption as in estuarine silt each tide is likely to wash off more than this. This assessment relates to in-situ silt and soils at the location of maximum deposition and does not model any dispersion of suspended silt in the Mersey itself.

Given the above assumptions, we predict indicative process contributions of:

Pollutant	Interim Freshwater Sediment Quality Guideline (ISQG)	PC as% of ISQG	Predicted Effects Level(PEL)	PC as % of PEL	Background*	PC as % of Background
Dioxins and Furans	0.85 ng(TEQ)/kg	<3	21.5 ng(TEQ)/kg	<0.2	8.7** ng(TEQ)/kg	<0.3
Arsenic (As)	5.9 mg/kg	<0.01	17 mg/kg	<0.01	4.5*** mg/kg	<0.01
Cadmium (Cd)	0.6 mg/kg	<0.01	3.5 mg/kg	<0.005	0.1 mg/kg	<0.1
Chromium (Cr)	37.3 mg/kg	<0.1	90 mg/kg	<0.04	52.3 mg/kg	<0.1
Lead (Pb)	35 mg/kg	<0.2	91.3 mg/kg	<0.05	30.21 mg/kg	<0.2
Mercury (Hg)	0.17 mg/kg	<3	0.486 mg/kg	<1	0.7 mg/kg	<1
Nickel (Ni)	NA	NA	NA	NA	15.91 mg/kg	<0.3
* Lower value from available reference sources to ensure the comparison is conservative. BL8031/A The Mersey Estuary: Monitoring Surveys 2003 and 2004, Brixham Environmental Laboratory, Astra Zeneca UK Ltd. unless otherwise stated						
** Hurst, R et al 2004. Determination of dioxin and dioxin-like compounds in sediments from UK estuaries using a bio-analytical approach: chemical-activated luciferase expression (CALUX) assay						
*** B.J. Harland et al 2000. The distribution of mercury and other trace metals in the sediments of the Mersey Estuary over 25 years 1974-1998 The Science of the Total Environment 253(2000)45-62						

Due to the very low predicted concentrations relative to the effects levels and background concentrations, we conclude that the impact of the emissions of dioxins and heavy metals on the estuary sediment is insignificant.

[2] Risk Assessment of Dioxin releases from Municipal Waste Incinerators, Her Majesty's Inspectorate of Pollution, March 1996.

[3] http://www.environment-agency.gov.uk/static/documents/Business/Interim_Metals_Guidance .pdf

As there are no WID limits for PCBs and dioxin-like PCBs predictive modelling of the impact on the environment was not carried out. There is evidence that emissions of these substances from MWIs are about 10 times lower than emissions of dioxins and furans. We conclude that at these levels emissions of PCBs and dioxin-like PCBs on the estuary sediment do not indicate a significant risk. It is a requirement of the permit to monitor the emissions of PCBs and dioxins-like PCBs; in this way more information shall be obtained during the operation of the incinerator.

Impact of dioxins on heronries

Two nesting heronries, Pitts Heath and Green Wood, are located about 6 km north east of the installation. In a 2003 report DEFRA identified heron eggshells from these sites as being contaminated with PCBs and dioxins. The report stated that it is not clear what is the significance of the dioxin levels in the eggshell; there were no deformed chicks or adults in evidence. Consideration of PCBs and dioxin-like PCBs is described in the previous section.

It is not clear where the feeding grounds for the herons are situated but the most sensitive location, for fish food, is likely to be the silt and marshes of the Mersey estuary. We can confirm that for nesting grounds at such distances there will be insignificant impact from the dioxin emissions of the EfW. Hale Gate Farm, the most sensitive receptor, is located no more than 2.2 km from the installation and has been predicted to experience insignificant impact by deposited dioxin (section 5.3.2.1 above). In respect of the feeding areas for fish, it is considered that the additional contribution of dioxins to silt is not likely to have a significant effect on the feeding grounds (see table above).

5.5 Impact of abnormal operations

WID abnormal operations are defined 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 CO, during which the concentrations in the discharges into air may exceed the normal emission limit values.

In an answer to a Notice under Schedule 5 EPR for further information, the Applicant confirms that there will be a particular configuration of CEM on each of the stacks that will maintain continuous monitoring in the event of the failure of a device:

- Each stack flue will have two separate independent Dust Monitors (ie, 8 in total).
- A spare Multicomponent Analyser/TOC Analyser will be provided for each pair of stacks that can be switched between either, from the control room, within ten minutes (6 in total).

It should be borne in mind that this facility consists of four incineration lines; each line having one SNCR abatement system, two acid gas abatement systems, two carbon injection systems and two separate bag filter systems in

series. For the following WID abnormal operation consideration, the scenarios of simultaneous failure of all four SNCR systems or all eight acid abatement systems or all eight carbon injection systems or all eight bag filters were examined. This demonstrates the worst case but extremely unlikely situation. A more realistic worst case would be if only one abatement system on one line failed. Further, the failure of both bag filter units in one incineration line is also considered to be highly unlikely.

WID abnormal operations are limited by the WID to no more 4 hours of continuous operation and no more than 60 hours in total 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 period of abnormal operation is relatively short when compared with around 8,000 hours per year of total operating hours (i.e. <1%).

WID abnormal operations have the potential to have a greater short-term impact on the environment. The Applicant has considered that during periods of abnormal operation, emissions of pollutants would increase as follows:

For a maximum of 4 hours per occasion, 60 hours per year, emission increases would be, for the following pollutants in the indicated failure modes:

Failure mode	**Pollutant**	**Abated emission level**	**Emission at abnormal operation**
SNCR failure	NOx	400 mg/m^3	1012 mg/m^3 [1]
Bag filter failure	Particulates (PM_{10})	30 mg/m^3	150 mg/m^3 [2]
	Metals	Same ratio as particulates, above [3]	
	Dioxins	0.1 ng/m^3	10 ng/m^3 [4]
Acid gas abatement failure	HCl	60 mg/m^3	1820 mg/m^3 [5]
	HF	2 mg/m^3	10 mg/m^3 [5]
	SO_2	200 mg/m^3	850 mg/m^3 [5]
Carbon injection failure	Dioxins	0.1 ng/m^3	10 ng/m^3 [4]
	Mercury	0.05 mg/m^3	0.019 mg/m^3 [6]

Note [1]: SNCR abatement is expected to remove about 60.5% of NOx produced.

Note [2]: WID limit for abnormal operation

Note [3]: Additional metals emission expected to be in same ratio as particulates (150/30)

Note [4]: Agency guidance – 100 times limit

Note [5]: Unabated emissions per Application

Note [6]: Maximum emission based on expected mercury levels in treated incoming waste and unabated (ie below WID limit)

The results on the short-term and long-term environmental impacts are summarised below.

5.5.1 Short-term impact of emissions to air (WID abnormal operation)

Pollutant	EQS / EAL ($\mu g/m^3$)	Process Contribution (PC) ($\mu g/m^3$)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) ($\mu g/m^3$)	PEC as % EQS / EAL
NO_2	200	38.79	19.39	94.59	47.29
HCl	750	238.11	31.75	239.2	31.90
HF	160	1.31	0.82	6.23	3.89
SO_2 (15 min)	266	104.84	39.41	144.84	54.45
SO_2 (1 hr)	350	91.66	26.19	131.66	37.62
PM_{10}	50	6.54	13.1	32.14	64.28
Cd	1.5	0.33	21.81	0.3	21.8
Tl	30	0.33	1.09	0.3	1.1
Hg	7.5	0.65	8.72	0.7	8.8
Sb	150	0.32	0.21	0.3	0.2
As	15	0.32	2.13	0.3	2.1
Cr	3	1.60	53.49	1.6	53.6
Co	6	0.32	5.32	0.3	5.3
Cu	60	0.70	1.17	0.7	1.2
Pb	[1]	0.70	N/A	0.7	N/A
Mn	1500	0.32	0.02	0.3	0.0
Ni	30	1.62	5.41	1.6	5.4
V	1	0.32	31.90	0.3	32.6

Note [1]: No short term mean EAL/EQS specified for lead

From the table above, the emissions of the following substances can still be considered insignificant, in that each PC is still <10% of the short-term EQS/EAL: HF, Tl, Hg, Sb, As, Co, Cu, Mn, Ni (the comments made in section 5.2 regarding new EALs are relevant here).

Also from the table above, the non-insignificant emissions, ie NO_2, HCl, SO_2, Cd, PM_{10}, Cr and V are considered to have little potential to give rise to significant pollution because each PEC is less than the short term EQS/EAL.

In respect of dioxins and furans emissions during abnormal operation, the impact in the short term of elevated emission of dioxins and furans is not likely to be significant as they accumulate slowly in the body over time and accordingly a short-term emission of 100 times the benchmark value for four hours would not have an acute effect by inhalation on human health.

5.5.2 Long-term impact of emissions to air (WID abnormal operation)

Pollutant	EQS / EAL ($\mu g/m^3$)	Process Contribution (PC) ($\mu g/m^3$)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) ($\mu g/m^3$)	PEC as % EQS / EAL
NO_2	40	0.94	2.35	28.84	72.10
HCl	20	0.081	0.40	0.62	3.08
HF	16	0.132	0.83	2.59	16.19
SO_2	50	0.339	0.68	20.33	40.66
PM_{10}	40	0.068	0.17	25.67	64.17
Cd	0.005	0.0002	3.41	0.0005	9.31
Tl	1	0.0002	0.02	0.0002	0.02
Hg	0.25	0.0003	0.14	0.0023	0.93
Sb	5	0.0002	0.00	0.0004	0.01
As	0.003	0.0002	5.55	0.0009	28.72
Cr	0.1	0.0008	0.84	0.00191	1.91
Cr(VI)	0.0002	0.00008	41.76	0.0002	84.64
Co	0.2	0.0002	0.08	0.0003	0.16
Cu	2	0.0004	0.02	0.0096	0.48
Pb	0.5	0.0012	0.24	0.0152	3.03
Mn	1	0.0002	0.02	0.0035	0.35
Ni	0.02	0.0008	4.24	0.0031	15.61
V	5	0.0002	0.00	0.0037	0.07

From the table above the emissions of the following substances can still be considered insignificant, in that each PC is <1% of the long-term EQS/EAL: HCl, HF, SO_2, PM_{10}, Tl, Hg, Sb, Co, Cu, Pb, Mn, V (the comments made in section 5.2 regarding new EALs are relevant here).

Also from the table the non-insignificant emissions, ie NO_2, Cd, As, Cr(VI) and Ni, can be considered to have little potential to give rise to significant pollution in that each PEC is less than the long-term EQS/EAL.

In the case of Cr(VI), if the Agency assumptions made in section 5.2.4 are used, the PC would be 0.000006 $\mu g/m^3$ (ie 5 times the PC for normal operation), significantly lower than the value used by the Applicant in the above table and even less likely to cause significant pollution.

The long-term impact of elevated emission of dioxins and furans likely to occur in a period of abnormal operation has been assessed by Agency. For abnormal operation an increase of 100 times the benchmark value for 60 hours per year would increase the amount deposited over a year at any given site by a factor of [(100 x 60/8000) + (7940/8000)] = 1.743. This will increase the amount ingested by the same factor. The Table describing the health risk assessment for the worst case farmer and resident (see 5.3.1 above) becomes:

Receptor	Worst case daily intake: Normal operation	Factor	Worst case daily intake: Abnormal operation
Farmer	0.0655 pg/kg-bw/day	1.743	0.1142 pg/kg-bw/day
Resident	0.0157 pg/kg-bw/day	1.743	0.0274 pg/kg-bw/day

The values resulting from abnormal operation are well below the TDI limit of 2 pg/kg-bw/day. The emissions of dioxins and furans during periods of abnormal operation are not considered likely to have an adverse effect on human health. Taking into account the comments made in section 5.3.2.1 about the likely over-estimation of results by the Applicant, we consider that the predicted intake is at least 10 times lower than that indicated in the table above.

Agency agrees with the Applicant that a period of abnormal operation up to the WID limits is not likely to cause significant pollution or increase the risk to human health to unacceptable levels.

5.6 In-Combination effects

Incinerators that are currently operational include the residues incinerator at INEOS Vinyls Ltd. As this plant is currently in operation (and has been for several years) the contribution to the background concentration is already established. The EfW contribution has been discussed above and when considered with the background levels (to give Predicted Environmental Concentrations) it becomes the in-combination effect.

Another incinerator is permitted at Ince Marshes about 6.5 km away; however it has not yet commenced operations so any in-combination effects should be considered. It is our modelling experience that incinerators greater than 2 km apart have insignificant in-combination effects on the environment between them if it is assumed that the emission levels of both incinerators are at the WID limits. This is a worst case situation as the incinerators would be expected to be operated at levels less than the limit to ensure consistent adherence to the limit. It is our conclusion therefore that any in-combination effects between the INEOS incinerator and any other are insignificant.

The Applicant has considered the in-combination effects with the Weston Point CHP facility about 200m away. Oxides of nitrogen were the only pollutants of concern considered here as the CHP is a natural gas burning facility. The Applicant has shown (see table below) that in the worst case, for short term impacts there is no change to the PC or PEC of the CHP plant (the PC and PEC of the EfW are considered in 5.2.1 and 5.2.2, above). The Applicant has also shown in the worst case that for long term impacts there is a slightly elevated, but still acceptable, combined PC and PEC:

Averaging period	EQS	Background	Source	PC	PC as % of EQS	PEC
I hour (short term)	200	52	CHP	29.6	14.8	81.6
			EfW	13.3	6.7	65.3
			Combined	29.6	14.8	81.6

Annual (long term)	40	26	CHP	2.4	5.9	28.4
			EfW	1.4	3.5	27.4
			Combined	3.0	7.4	29.0

(values in µg/m^3)

We agree with this assessment.

5.7 Impact Of Reduced Operating Load

A schedule 5 notice requiring further information was issued to obtain more information concerning the impact of the plant operating at throughputs lower than maximum. There was a concern that with different operating conditions – flow rates, concentrations etc – there may be an adverse impact of the emissions.

A response was received, dated 11 June 2010. The Applicant has shown that at 70% of maximum thermal load there is a lower volumetric flow and lower efflux velocity out of the stack and a lower rate of mass release of pollutants, corresponding to the reduced throughput. Assuming the worst case scenario, that the pollutants are released at the WID limits, the Applicant has demonstrated that for short term and long term considerations the ground level concentrations will not be increased.

Each line of the plant can operate at thermal load levels not less than 70% of design. We agree that operating at reduced thermal loads of not less than this, there is not likely to be a significant adverse effect. As the Applicant has committed to this restriction in the Application, condition 2.3.1 of the permit requires him to operate the plant in accordance with the restriction.

5.8 Other Emissions

For this incinerator, it is unlikely that there will be any significant environmental impact from other emissions, such as those to water, sewer, land or groundwater, fugitives, noise or odour. Thus these will be considered in the section on BAT.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

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

- We then consider control measures for the emissions which were not screened out as insignificant above. They are (from section 5.2, above): SO2, NO2 and Cd (for long term emissions) and SO2 (15 minute) and NO2 (for short term emissions).

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

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

6.1.1 Consideration of Furnace Type

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

The Waste Incineration BREF elaborates the furnace selection criteria as:

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

The BREF also provides a comparison of combustion and thermal treatment technologies and factors affecting their applicability and operational suitability used in EU and for all types of wastes. There is also some information on the

comparative costs. The table below has been extracted from the BREF tables. This table is also in line with the Guidance Note "The Incineration of Waste (EPR 5.01)). However, it should not be taken as an exhaustive list nor that all technologies listed have found equal application across Europe.

Comparison of thermal treatment technologies

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

Fluid bed - bubbling	Only finely divided consistent wastes. Limited use for raw MSW often applied to sludges	1 to 10 t/h	Good mixing Fly ashes of good leaching quality	Careful operation required to avoid clogging bed. Higher fly ash quantities.	TOC <3%	FGT cost may be lower. Costs of waste preparation
Fluid bed - circulating	Only finely divided consistent wastes. Limited use for raw MSW, often applied to sludges / RDF	1 to 20 t/h most used above 10 t/h	Greater fuel flexibility than BFB Fly ashes of good leaching quality	Cyclone required to conserve bed material Higher fly ash quantities	TOC <3%	FGT cost may be lower. Costs of preparation
Oscillating furnace	MSW / heterogeneous wastes	1 – 10 t/h	Robust Low maintenance Long history Low NO_x level Low LOI of bottom ash	Higher thermal loss than with grate furnace LCV under 15 G/t	TOC 0.5 – 3%	Similar to other technologies
Pulsed hearth	Only higher CV waste (LCV >20 GJ/t) Mainly used for clinical wastes	<7 t/h	Can deal with liquids and powders	Bed agitation may be lower	Dependent on waste type	Higher specific cost due to reduced capacity
Stepped and static hearths	Only higher CV waste (LCV >20 GJ/t) Mainly used for clinical wastes	No information	Can deal with liquids and powders	Bed agitation may be lower	Dependent on waste type	Higher specific cost due to reduced capacity
Spreader – stoker combustor	RDF and other particle feeds Poultry Manure Wood wastes	No information	Simple grate construction Less sensitive to particle size than FB	Only for well defined mono-streams	No information	No information
Gasification - fixed bed	Mixed plastic waste Other similar consistent streams Gasification	1 to 20 t/h	Low leaching residue Good burnout if oxygen blown	Limited waste feed Not full combustion High skill level Tar in raw gas	Low leaching bottom ash Good burnout with	High operation/ maintenance costs

	less widely used/proven than incineration		Syngas available Reduced oxidation of recyclable metals	Less widely proven	oxygen	
Gasification - entrained flow	Mixed plastic wastes Other similar consistent streams Not suited to untreated MSW Gasification less widely used/proven than incineration	To 10 t/h	Low leaching slag Reduced oxidation of recyclable metals	Limited waste feed Not full combustion High skill level Less widely proven	Low leaching slag	High operation/ maintenance costs Pretreatment costs high
Gasification - fluid bed	Mixed plastic wastes Shredded MSW Shredder residues Sludges Metal rich wastes Other similar consistent streams Less widely used/proven than incineration	5 – 20 t/h	Temperatures e.g. for Al recovery Separation of non-combustibles Can be combined with ash melting Reduced oxidation of recyclable metals	Limited waste size (<30cm) Tar in raw gas Higher UHV raw gas Less widely proven	If combined with ash melting chamber ash is vitrified	Lower than other gasifiers
Pyrolysis	Pretreated MSW High metal inert streams Shredder residues/plastics Pyrolysis is less widely used/proven than incineration	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	No oxidation of metals no combustion energy for metals/inert In reactor acid neutralisation possible Syngas available	Limited wastes Process control and engineering critical High skill req. Not widely proven Need market for syngas	Dependent on process temperature Residue produced requires further processing, sometimes combustion	High pre-treatment, operation and capital costs

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

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

6.1.2 The Applicant's choice of furnace

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

- Water Cooled Moving Grate Furnace
- Fluidised Bed
- Gasification
- Pyrolysis

The various options for thermal treatment of the proposed combination of waste materials have relative benefits and disadvantages. All four options are capable, subject to appropriate abatement measures being taken, of performing within WID emissions limits (although limited emissions performance data are reported in respect of gasification and pyrolysis). Whilst moving grate systems generate higher raw gas pollutant concentrations, the application of abatement, which is still required for all options, enables compliance with WID limits and in many instances, performance to achieve emissions well below these levels.

The performance of these options in terms of carbon dioxide releases is recognised as being dependant on the carbon within the waste material which the thermal treatment technology seeks to optimise in the energy conversion process. For the waste materials to be accepted at the facility, carbon dioxide releases from the facility associated with the combustion of the waste material will therefore be limited by the plant capacity of 850,000tpa. Whilst this addresses the potential for carbon dioxide releases directly associated with the waste material, the potential releases of carbon dioxide associated with:

- the efficiencies of techniques for converting combusted/combustible gases resulting from the process to heat and power;
- the requirement for supplementary combustion of fuel to maintain the thermal treatment process; and
- measures to maximise internal energy efficiency of the plant itself (including the 'parasitic' load required to drive supporting equipment and plant)

are also considered relevant. Compared with the other options considered, moving grate systems have similar or improved performance in all three areas.

Moving grate has either a similar or improved performance compared to the other options in relation to electrical efficiency, residue generation, odour, raw material consumption, noise and potential for accidents. In addition, as the Runcorn Plant will be incinerating treated waste, which has a higher calorific value than untreated waste, a water cooled moving grate has been chosen over an air cooled grate due to its higher heat transfer capability and consequential ability to maintain grate temperature.

In this context and alongside in particular the fact that its reliability at a commercial scale is proven and that it provides a cost effective option, moving grate has been selected as the thermal treatment technology and is considered BAT for the proposed facility on this basis.

The Applicant considered a fifth furnace technology: Plasma Arc Gasification. Whilst this is an established technology, the process can be very complex, expensive and operator intensive. There would be significant challenge in achieving the very high temperature throughout a solid waste mass at large scale and this is a practical constraint for scaling the Application. To date most applications of Plasma Arc technology for wastes or waste derived fuels have only been carried out on a research or demonstration basis at small scale and the technology has not been proven on a commercial basis. It is therefore not considered proven for scale up to the size of the Applicant's facility and was discounted from consideration.

The Applicant also considered the potential for further biological treatment including anaerobic digestion of the waste before incineration. This option was not considered viable because the waste would have already undergone a biological process to stabilise it to a specified net calorific value (NCV) as part of the pre-treatment before it arrives on site. If additional biological treatment was undertaken this would result in greater quantities of incoming waste of lower NCV being imported to ensure energy requirements were achieved and a risk that more supplementary fuel would be required to maintain adequate combustion temperatures.

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

6.1.3 Boiler design

The function of the boiler is to convert the heat energy from the combustion process taking place in the furnace into a form that can be conveniently utilised to generate electricity and steam. The form this takes is by the conversion of water to high pressure steam in the boiler, which is then passed

to a steam turbine to produce electricity and a lower pressure steam for beneficial use elsewhere.

The Applicant has designed the furnace and boiler to be integral to ensure the maximum amount of energy is recovered. The boiler is of a proven design and comprises three vertical radiant passes and a horizontal convective section. Several economiser bundles are located at the end of the horizontal pass in order to achieve a low flue gas outlet temperature (140-145ºC). The transitions between the several different boiler passes are designed to promote ash separation and uniform flow distribution. Whilst measures to minimise dust carryover are included within the design, some dust will still be present which over time will accumulate as fouling within the boilers. A mechanical rapping system will be installed within the convective section for removal of any deposits.

The boiler convective section is designed in such a way that the retention time in the temperature range whereby dioxin reformation (known as the *de novo* synthesis) can take place (200-450ºC) is reduced to a minimum value due to sufficiently high velocities of the flue gases. Dust can promote the formation of dioxins by acting as a carrier for the catalysts for these reactions. The measures included within the plant and specifically the boiler design to minimise dust carryover therefore also contribute to minimising the reformation of dioxins.

6.2 BAT and emissions control

The prime function of flue gas treatment is to reduce the concentration of pollutants in the exhaust gas to a level at which they will cause no significant environmental harm. The techniques which are described as BAT individually are targeted to remove specific pollutants, but the BREF notes that there is benefit from considering the FGT system as a whole unit. Individual units often interact, providing a primary abatement for some pollutants and an additional effect on others.

The BREF lists the general factors requiring consideration when selecting flue-gas treatment (FGT) systems as:

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

- reduction of emissions by primary methods
- release of noise.

6.2.1 Particulate Matter

The Applicant will use fabric filters for the abatement of particulate matter. Fabric filters provide reliable abatement of particulate matter to below 5 mg/m^3 and are BAT for most installations. The Applicant will use multiple compartment filters with burst bag detection to minimise the risk of increased particulate emissions in the event of bag rupture.

The BREF on Waste Incineration (section 5.1, paragraph 38) indicates that a double bank of bag filters should be avoided unless there are local indicators to suggest otherwise. We agree with the Applicant's design of a double bank of filters because there are significant local concerns about particulate emissions. Emissions of particulate matter have been previously been assessed as insignificant, and so the Agency agrees that the Applicant's proposed technique is BAT for the Installation.

6.2.2 Oxides of Nitrogen

The Applicant will implement the following primary measures:

- Low NOx burners for auxiliary fuel burning – this technique reduces NOx at source and is defined as BAT where auxiliary burners are required.
- Optimised primary and secondary air injection to provide turbulence within the combustion chamber – this technique is BAT for all plant.
- Flue gas recycling (FGR) is not being implemented in this incinerator. The proposed furnace technology employs a secondary air system which incorporates a prism distribution system as opposed to the conventional nozzle systems. The inclusion of the prism, which acts as a static mixer, provides greater combustion efficiency compared to conventional systems resulting in lower NOx formation. Further, the plant has been designed with an additional economiser within the boiler section allowing greater heat recovery within the boilers (reducing exit temperatures to approximately 140ºC compared to more typical 178-200ºC) and consequently increasing the overall plant efficiency. FGR is reported as introducing corrosion problems as a result of dew point corrosion due to SOx in the recirculation ducting. In practice this leads to operational problems typically requiring replacement of ducting and valves after a relatively short time. Given that the design minimises NOx levels and maximises energy recovery via alternative techniques, the resulting impact on the overall reliability of the plant from FGR is not considered justified and the proposed combination of measures is considered to represent BAT.

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

SCR can reduce NO_x levels to below 70 mg/m^3 and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency, periodic replacement of the catalysts also produces a hazardous waste. SNCR can typically reduce NO_x levels to between 150 and 180 mg/m^3, it relies on an optimum temperature of around 900 deg C and sufficient retention time for reduction. SNCR is more likely to have higher levels of ammonia slip. The technique can be applied to all plant unless lower NO_x releases are required for local environmental protection. Urea or ammonia can be used as the reagent with either technique, urea is somewhat easier to handle than ammonia and has a wider operating temperature window, but tends to result in higher emissions of N_2O. Either reagent is BAT.

The Applicant will use SNCR with ammonia as the reagent.

Emissions of NO_x cannot be screened out as insignificant (see section 5.2, above). Therefore the Applicant has carried out a cost / benefit study of the alternative techniques.

The following table describes the relative costs between SCR and SNCR technology for this plant.

Comparison of Costs per Tonne of NO_x Abatement [1]

	Tonnes of NOx abated per annum [2]	Equivalent annual cost [3]	Equivalent annual cost per tonne of NOx abated per annum
SNCR	1,493	£1,453,033	£973
SCR	2,067	£3,921,316	£1,897

Note [1] Cost values taken over a 20 year operating life for the plant.

Note [2] Annual tonnes abated for each technology based on an annual NO_x generation of 2469 tonnes.

Note [3] Annual equivalent costs comprise capital costs for SCR and SNCR of £15,320,000 and £960,000 respectively discounted over the plant life and annual operating costs.

The cost per tonne of NO_x abated over the projected life of the plant has been compared with the environmental impact as shown in the table below.

	Cost of NOx removal £/tonne	PC (long term) as % of EAL	PEC (long term) as % of EAL
SNCR	£973	8.8 [1]	83.3
SCR	£1,897	3.63 [1]	78.2

Note [1] this assessment was carried out using default conservative assumptions within the H1 assessment so that both options can be compared on a similar basis. However the predicted impacts from more detailed dispersion modelling at WID limits, indicates significantly lower impacts with a PC/EAL of 3.5% and PEC/EAL of 68.5% for SNCR (see section 5.2.1 above).

As can be seen the SCR provides an additional abatement of 574 tonnes of NOx per annum. However this is achieved at an annual additional cost of just

under £2.5 million or at nearly double the cost per tonne abated achieved by SNCR.

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

On this basis we agree that the additional costs are not considered justified.

The Applicant has justified the use of ammonia as the reagent on the basis of the lower N_2O emissions and its expertise in the handling of hazardous chemicals (see section 4.3.8, above). The Agency agrees with this assessment.

The amount of ammonia used for NO_x abatement will be optimised to maximise NO_x reduction and minimise NH_3 slip. Improvement condition IC4 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system. The Operator is also required to monitor continuously and report every 3 months on NH_3 and N_2O emissions.

6.2.3 Acid Gases, SO_x, HCl and HF

The Applicant will implement the following primary measures:

- Use of low sulphur fuels for start up and auxiliary burners – natural gas is to be used and will be of low sulphur content (i.e. <50ppm); this will reduce SOx at source.
- Management of problem wastes – this waste derived fuel is treated by the removal of problematic wastes such as PVC before it is brought onto site.

There are three recognised techniques for secondary measures to reduce acid gases. These are wet, dry and semi-dry scrubbing. Wet scrubbing produces an effluent for treatment and disposal in compliance with Article 8 of WID, it will also require reheat of the exhaust to avoid a visible plume. Wet scrubbing is unlikely to be BAT except where there is high acid gas and metal components in the exhaust gas as may be the case for some hazardous waste incinerators.

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

In both dry and semi-dry systems, the injected powdered reagent reacts with the acid gases and is removed from the gas stream by the bag filter system. The powdered materials are either lime or sodium bicarbonate. Both are effective at reducing acid gases, and dosing rates can be controlled from continuously monitoring acid gas emissions. The decision on which reagent to

use is normally economic. Lime produces lower leaching APC residues than sodium bicarbonate and the reaction temperature is well suited to bag filters. It tends to be lower cost, but it is a corrosive material and can generate a greater volume of solid waste residues than sodium bicarbonate. The choice of reagent is a finely balanced decision and Operator's often prefer to have the capability to use either.

The Applicant has carried out an options appraisal for three types of technology to abate acid gas emissions; a dry system (single stage injection of sodium bicarbonate), a double dry system (two stages of calcium hydroxide injection and reaction); a dry/semi dry system (a combination of calcium hydroxide and calcium oxide injections in two stages, one dry and one semi dry). Air quality impacts, photochemical ozone creation potential (POCP), global warming potential (GWP) and waste hazard were the criteria examined for each of the options. The following table summarises the relative environmental performances of each of the options:

	Option performance		
	Dry	**Double Dry**	**Dry/Semi dry**
Emissions to air [1]			
SO_2	264	247	287
HCl	23	40	29
HF	5	0.6	0.6
GWP Performance [2]	35,731	16,554	11,360
POCP Performance [3]	1,268	1,185	1,379
Waste hazard [4]	48,120	54,288	55,224

Note [1] values are shown as tonnes per year released; base situation, no abatement, being 4,881 tonnes SO_2, 10,451 tonnes HCl and 57 tonnes HF.

Note [2] values shown are tonnes CO_2 per year released as the result of the chemical reactions taking place in the abatement process.

Note [3] values shown are the effects of the SO_2 emission on the POCP (the lower the better).

Note [4] values shown are tonnes of hazardous waste per year. As the disposal route is the same for all options the same ranking is given to each option (see next table).

Each option was then ranked to determine the relative effectiveness for each criterion. The following table summarises the ranking (the best performing option of each parameter ranks "1" and the worst "3", so the lowest aggregated rank value is the best overall performer):

	Option ranking		
Parameter	**Dry**	**Double Dry**	**Dry/Semi dry**
Emissions to air			
SO_2	2	1	3
HCl	1	3	2
HF	3	1	1
GWP Performance	3	2	1
POCP Performance	2	1	3
Waste hazard	1	1	1
Total	**12**	**9**	**11**

In terms of the primary objective for operating the abatement (abatement of acid gas emissions), the Double Dry option provides improved performance in reducing SO_2. The Dry only option provides marginally improved performance in the reduction of HCl. The Double Dry and Dry/Semi Dry options achieve lower releases of HF compared to the Dry option. Whilst all options are capable of achieving acid gas emissions below the emission limits specified within the WID, the Double Dry option provides the best overall environmental performance. It is therefore concluded that the Double Dry system is BAT for this Installation.

6.2.4 Carbon monoxide and volatile organic compounds (VOCs)

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

6.2.5 Dioxins and furans

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

- optimisation of combustion control including the maintenance of WID combustion conditions on temperature and residence time, which has been considered in 6.1.1 above;
- avoidance of *de novo* synthesis, which has been covered in the consideration of boiler design, in 6.1.3 above;
- the effective removal of particulate matter, which has been considered in 6.2.1 above;
- injection of activated carbon. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant. Effective control of acid gas emissions also assists in the control of dioxin releases.

In this case the Applicant will use separate feeds and we are satisfied their proposals are BAT.

6.2.6 Metals

The prevention and minimisation of metal emissions is achieved through the effective removal of particulate matter, and this has been considered in 6.2.1 above.

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

feed of activated carbon would normally be considered BAT unless the feed was relatively constant.

In this case the Applicant will use separate feeds and we are satisfied their proposals are BAT.

6.3 BAT and global warming potential

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

The principal greenhouse gas emitted is CO_2, but the plant also emits small amounts of NH_3 and N_2O arising from the operation of secondary NO_x abatement. NH_3 has a global warming potential of 1 times that of CO_2 (ie the same as CO_2) whereas N_2O has a global warming potential 310 times that of CO_2. The Applicant will therefore be required to optimise the performance of the secondary NO_x abatement system to ensure its GWP impact is minimised.

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

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

From the H1 assessment, the GWP was estimated to be as follows:

Parameter	**GWP (tonnes CO_2 equivalent)**
Direct CO_2 emissions (auxiliary fuel)	7,913
CO_2 emissions from the process	872,000
N_2O from the process	17,803
Total	**897,716**
Offset CO_2 emissions [1]	**616,000**
Net GWP (rounded)	**282,000**

Note [1]: estimate based on qualifying energy produced (ie excluding parasitic electricity and biomass derived energy) and elimination of greenhouse gas emissions from landfill. We believe that the calculation derived from the Application gives a conservative value and there may be additional gains by not sending waste to landfill.

Taking this into account, the net emissions of CO_2 equivalent from the Installation are estimated at 282,000 tonnes per annum. At this level emissions cannot be characterised as insignificant. The Installation is not

subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2003; therefore it is a requirement of IPPCD to investigate how emissions of greenhouse gases emitted from the Installation might be prevented or minimised.

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

On the debit side

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

On the credit side

- CO_2 saved from the export of electricity to the public supply by displacement of burning of virgin fuels;
- CO_2 saved from the use of waste heat by displacement of burning of virgin fuels;
- CO_2 equivalent saved from greenhouse gas emissions by displacement of waste disposal to landfill.

The Applicant's assessment shows that the GWP of the plant is dominated by the emissions of carbon dioxide that are releases as a result of waste combustion. This is constant for all options considered in the BAT assessment.

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

	Technology options	**Predicted GWP [1]**	**Best option**	**Applicant's Preferred option**
NOx abatement	SNCR	~~8,979~~ 9,223	9,223	9,223
	SCR	~~2,466~~ 10,097		
Acid gas abatement	Dry	~~35,504~~ 35,731		
	Double dry	~~16,173~~ 16,554		16,554
	Dry/Semi dry	~~11,098~~ 11,360	11,360	
Totals			20,583	25,777
GWP from incinerator			872,000	872,000

(values in tonnes CO_2 equivalent)
Note [1]: struck-out values are those discovered in error after final public consultation.

Taking all these factors into account, the Operator's assessment shows a 0.6% (~~1.33~~%; see note [1] to table above) difference in global warming potential between the best option in terms of GWP alone and the Operator's preferred option. The purpose of a BAT appraisal is to determine which option minimises the impact on the environment as a whole. In this context the small benefit in terms of GWP of the other options is considered to be more than offset by the other benefits of the preferred option.

The Environment Agency agrees with this assessment and that the chosen options are BAT for the Installation.

6.4 BAT and POPs

International action on Persistent Organic pollutants (POPs) is required under the UN's Stockholm Convention, which entered into force in 2004 and has been signed by 151 nations. The EU implemented the 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) to give effect to Article 6(3) of the EC POPs Regulation when determining applications for Environmental Permits. However, it needs to be borne in mind that this Application is for a particular type of Installation, namely a waste incinerator.

The Stockholm Convention distinguishes between intentionally- and unintentionally-produced POPs. Intentionally-produced POPs are those used deliberately (mainly in the past) in agriculture (primarily as pesticides) and industry. Those intentionally-produced POPs are not relevant where waste incineration is concerned. This is logical, not least because high-temperature incineration is one of the prescribed methods for destroying POPs.

The unintentionally-produced POPs addressed by the Convention are:

- dioxins and furans;
- HCB; and
- PCBs.
- PeCB

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

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

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

The 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. The Secretary of State has directed regulators to 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 5.2 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.

Hexachlorobenzene (HCB) is addressed by the European Environment Agency (EEA), which advises that:

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

Pentchlorobenzene (PeCB) is a new addition to the POPs list to be considered under incineration. PeCB has been used as a fungicide or flame

retardant, there is no data available however on production, recent or past, outside the UN-ECE region. In the Stockholm Convention Protocols several emission control techniques are given which will also lead to a reduction of PeCB emissions: Annex V (Best Available Techniques to control emissions of persistent organic pollutants from major stationary sources): PeCBs can be emitted from the same sources as described for PCDD/F in Annex V: waste incineration, thermal metallurgic processes and combustion plants providing energy. The approaches described in Annex V to control the emissions of PCDD/F will subsequently also lead to a reduction of the emissions of PeCBs.

We have assessed the control techniques proposed for dioxins by the Applicant and have concluded that they are appropriate for dioxin control. We are confident that these controls will also minimise the release of HCB, PCB and PeCB.

We believe that the Permit ensures that the formation and release of POPs will be prevented or minimised. As we explain above, high-temperature incineration is one of the prescribed methods for destroying POPs. The requirements of the Stockholm Convention in relation to unintentionally-produced POPs are delivered through the IPPCD and the WID, which require the use of BAT to prevent or, where that is not possible, minimise all harmful emissions, including POPs. We are therefore satisfied that the substantive requirements of the Convention and the POPs Regulation have been addressed and complied with.

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

The proposed facility does not use a wet gas cleaning system and does not therefore generate waste water associated with this activity. As a consequence WID limits to water do not apply.

Cooling tower water purge and surface rainwater collected from uncontained areas is collected and passed to the process water tank for use in the plant. Any surplus water from these sources is released to the Runcorn and Weston canal; this is the only discharge to water from the plant:

- Surface water collected in contained areas and boiler blowdown are used in the bottom ash quenching part of the operation.
- Excess boiler water released during boiler maintenance is collected, stored and reused.
- In the event of a fire in the waste bunkers, firewater collects in the bunkers and then extracted for disposal by tanker off-site.
- In the event of a fire elsewhere in the plant, firewater is contained and tested before disposal. Disposal will be to the surface water system or tankered off-site as appropriate.

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

6.5.2 Emissions to sewer

There are no emissions to sewer.

6.5.3 Fugitive emissions

The WID specifies that Applicants 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.

All liquid storage tanks are water tight and contained in bunded areas of capacity of at least 110% the capacity of the largest tank in the bund or and 25% the capacity of the total tankage in a bund. Drums of material are also stored in dedicated bunded areas. All process areas are located on hard standing with sealed drainage.

There is capacity to collect rainwater and contaminated firewater. This can be discharged to water if, after testing, it proves to be satisfactory or tankered off site if the quality is unacceptable

Spill kits are available to clean up spillage.

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

6.5.4 Odour

The incoming RDF (including equivalent appropriately treated C&I material) does not present the same potential for odour as raw municipal solid waste (MSW). This material is relatively odourless. Odour control measures are provided for the delivery and storage area for the waste material using a combination of containment and treatment. 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. The waste material is stored within a building and the doors are kept shut when not required for access. The tipping hall is maintained under slight negative pressure and therefore any potentially odorous air and airborne particulates is extracted from above the waste material storage bunkers and the extracted air used as air feed to the combustion stage, thus destroying any potential odours.

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

6.5.5 Noise and vibration

The Application contained a noise impact assessment which identified local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing

ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS4142 to compare the predicted plant rating noise levels with the established background levels.

We agree with the modelling approach taken by the Applicant to the noise impact assessment. The impact assessment considered only noise sources within the site boundary. The Applicant's assessment included noise contributions from: plant and machinery, cooling towers, rail traffic and road traffic. Contributions of noise sources from outside the installation boundary are for consideration under planning rather than Environmental Permitting.

We carried out an audit of the Applicant's assessment and found the likely difference between the noise level from the facility and measured background noise level to be less than +10dB at the most sensitive receptor. The BS 4142:1997 method for rating industrial noise affecting mixed residential and industrial areas states that a difference of +10dB or more indicates that complaints are likely. Based on the information provided, we conclude that noise levels are not likely to cause complaints at any nearby noise sensitive receptors.

The Applicant has included within the design of the plant the following noise mitigation measures:

- Deliveries by road and unloading of trains to occur only during the day
- Noise barriers erected on several sides of the plant (including by Clarks Terrace, identified as the most sensitive receptor)
- Noise attenuation at the cooling water towers
- Enclosing the ID fans to reduce noise emissions
- Tipping hall doors to incorporate automatic closing devices

The dominant noise sources for Clarks Terrace and Sandy Lane are the contributions from Heavy Goods Vehicles (daytime) and the Cooling Water Towers (day and night-time). The update on Noise Assessment submitted in May 2010 details the noise mitigation measures that will be undertaken: low noise fans, noise attenuation equipment in the basin (for the impact noise of falling water) and inlet silencers. Thus the proposed cooling water design goes beyond that of standard cooling tower designs which provide limited noise attenuation, normally focussed only on mitigation of noise from falling water. We are satisfied that this represents BAT for this site.

Despite these measures, it is likely the noise emissions from the proposed Installation would add up to 2dB (daytime) and up to 3dB (night-time) to the existing background at Clarks Terrace receptors and add up to 1 dB (day and night-time) to the existing background at the Sandy Lane West receptors. At these levels we conclude that a specific noise management plan is not required. Condition 3.4.2 enables us to require the Operator to submit a noise management plan in the event we consider there to be noise pollution when the plant is in operation.

A pre-operational condition (number PO06) has been included in the permit that requires the Applicant to provide a detailed report for a noise monitoring

programme that will be carried out during commissioning and when the plant is fully operational. This will enable us to ensure that noise emissions are acceptable and to confirm that it is not causing pollution. In the event that a problem is revealed then we will be able to require action to rectify it.

Based upon the information in the Application we are satisfied that the appropriate measures will be in place to minimise noise and vibration and that they will not give rise to pollution.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

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

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

(i) Local factors

The impact of the activity on the nearby Habitats site and SSSI is not significant and more stringent limits than those specified by WID are not required.

(ii) National and European EQSs

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

(iii) Global Warming

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

We have therefore considered setting equivalent parameters or technical measures for CO_2. However, provided energy is recovered efficiently (see section 4.3.7 above), there are no additional equivalent technical measures (beyond those relating to the quantity and characteristics of the waste) that can be imposed that do not run counter to the primary purpose of the plant,

which is the destruction of waste. Controls in the form of restrictions on the volume and type of waste that can be accepted at the Installation and permit conditions relating to energy efficiency effectively apply equivalent technical measures to limit CO_2 emissions.

(iv) Commissioning

Before the plant can become fully operational it will be necessary for it to be commissioned. WID and the Permit cover operations once the plant is fully operational. Before it can be commissioned the Operator needs to submit its proposals for commissioning to the Agency for approval. Commissioning will be carried out in accordance with the approved proposals.

In addition, because it is recognised that certain information presented in the Application was based on design data or data from similar equipment, the commissioning phase is the earliest opportunity to verify much of this information. The following verifications will be determined by the Applicant:

- Calibration of CEMs in accordance with BS EN 14181 (a requirement in improvement condition IC2).
- Verification of furnace residence time, temperature and oxygen content (IC3).
- The plant in total conforms with the permit conditions (IC4).
- Abatement plant optimisation details (IC4).
- Development of procedures to demonstrate satisfactory process control (IC4).
- The comparison of boiler and bottom ashes to confirm they can be mixed together (permit condition 2.3, referencing a commitment by the Applicant in the Application).

6.7 Monitoring

6.7.1 Monitoring during normal operations

We have decided that monitoring should be carried out for the parameters listed in tables S3.1 to S3.5 in Schedule 3 using the methods and to the frequencies specified in those tables. These monitoring requirements have been imposed in order to demonstrate compliance with emission limit values.

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

The ammonia continuous monitor will be certified to MCERTS although no emission limit value has been set at this time. Monitoring of N_2O and ammonia have been set as a requirement of the permit to demonstrate the optimum environmental performance of the NO_x abatement process.

Based on the information in the Application and the requirements set in the conditions of the permit we are satisfied that the Operator's techniques,

personnel and equipment will have either MCERTS certification or MCERTS accreditation as appropriate.

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

The Operator will provide back-up CEMS working in parallel to the operating CEMS. These will be switched into full operation immediately in the event that there is any failure in the regular monitoring equipment. The back-up CEMS measure the same parameters as the operating CEMS. In the unlikely event that the back-up CEMS also fail and this situation lasts for 4 hours, Condition 2.3.10 of the permit requires that the WID abnormal operating conditions apply.

6.7.3 Other Monitoring Requirements

Other monitoring requirements have been set by the Agency in Condition 3.5.1 and Schedule 3 of the permit. These monitoring requirements are to enable correction of measured concentration of substances to the appropriate reference conditions; to gather information about the performance of the SNCR system; to deliver guidance from DEFRA that dioxin-like PCBs and PAHs should be monitored and to deliver the requirements of WID for monitoring of residues and temperature in the combustion chamber.

In addition improvement condition IC1 requires an exercise be carried out 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.

6.7.4 Continuous emissions monitoring for dioxins and mercury

The WID specifies manual extractive sampling for mercury and dioxin monitoring. However continuous emission monitoring/sampling equipment for both substances 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 Committee European de Normalisation (CEN) 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 manner in which the standard has been developed and believes it does not entirely fulfil its purpose. The Sick-Maihak certification was not renewed in 2009. Another instrument (Durag) can measure total mercury and has current certification.

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 EN1948. Cross-stack sampling in accordance with EN13284-1 (the low dust standard) is a pre-requisite of EN1948, whereas continuous sampling techniques are designed for operation at one or at most two fixed points across the stack.

For either continuous monitor 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 emission it is not justifiable to require the Operator to install continuous monitoring for these substances.

In accordance with its 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 emission estimates.

6.8 Reporting

We have specified the reporting requirements in Schedule 4 of the Permit either to meet the reporting requirements set out in the WID, or to ensure data is reported to enable timely review by the Agency to ensure compliance with permit conditions and to monitor the efficiency of material use and energy recovery at the Installation.

7 Other legal requirements

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

7.1 The EPR 2010 and related Directives

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

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

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

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

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

The grant or refusal of development consent is a matter for the relevant local planning authority. The Environment Agency's obligation is therefore to take into consideration any relevant information obtained or conclusion arrived at by the local planning authorities pursuant to those EIA Directive articles. In the case of the Applicant, as the plant is a generator of over 50 MW it was assessed by the Secretary of State for Business Enterprise and Regulatory Reform (BERR) under section 36 of the Electricity Act.

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

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The decision of the Secretary of State to grant planning permission on 16 September 2008.
- The decision letter of the Secretary of State 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.

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

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

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

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

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

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

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

Article 23(1) requires the permit to specify:

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

These are all covered by permit conditions.

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

We consider that the intended method of waste treatment is acceptable from the point of view of environmental protection so Article 23(3) does not apply.

Energy efficiency is dealt with elsewhere in this document but we consider the conditions of the permit ensure that the recovery of energy take place with a high level of energy efficiency in accordance with Article 23(4).

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

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

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

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

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

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

Regulation 59 of the EPR 2010 requires the 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 has been consulted upon in line with our public participation statement, as well as with the Agency's RGS6 on Sites of High Public Interest, which addresses specifically extended consultation arrangements for determinations where public interest is particularly high. This satisfies the requirements of the Public Participation Directive.

Our decision in this case has been reached following a programme of extended public consultation, both on the original Application and later, separately, on the draft permit and a draft decision document. The way in which this has been done is set out in Section 2 above. A summary of the

responses received to our consultations and our consideration of them is set out in Annex 4.

7.2 National primary legislation

7.2.1 **Environment Act 1995**

(i) Section 4 (Pursuit of Sustainable Development)

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

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

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

(ii) Section 7 (Pursuit of Conservation Objectives)

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

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

(iii) Section 81 (National Air Quality Strategy)

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

7.2.2 **Human Rights Act 1998**

We have considered potential interference with rights addressed by the European Convention on Human Rights in reaching our decision and consider that our decision is compatible with our duties under the Human Rights Act 1998. In particular, we have considered the right to life (Article 2), the right to a fair trial (Article 6), the right to respect for private and family life (Article 8)

and the right to protection of property (Article 1, First Protocol). We do not believe that Convention rights are engaged in relation to this determination.

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

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

7.2.4 **Wildlife and Countryside Act 1981**

Under section 28G of the Wildlife and Countryside Act 1981 the Agency has a duty to take reasonable steps to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which a site is of special scientific interest. Under section 28I the Agency has a duty to consult Natural England/Countryside Council for Wales in relation to any permit that is likely to damage SSSIs.

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

The CROW assessment is summarised in greater detail in section 5.4 of this document. A copy of the full Appendix 4 Assessment can be found on the public register.

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

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

7.3 National secondary legislation

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

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

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

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

7.3.2 **Water 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.

7.3.3 **The Persistent Organic Pollutants Regulations 2007**

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

7.4 Other relevant EU legislation

None applies

7.5 Other relevant legal requirements

7.5.1 Duty to Involve

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

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

ANNEX 1 : APPLICATION OF THE WASTE INCINERATION DIRECTIVE

WID Article	Requirement	Delivered by
4(3)	Measurement techniques for emissions into the air comply with Annex III	See below on compliance with Article 11
4(4)	Compliance with any applicable requirement of directives on: Urban Waste Water Treatment, the IPPC, Air Quality Framework, Dangerous Substances, Landfill.	Landfill Directive is not relevant to this Installation. Relevant requirements of all other directives are delivered via EPR.
4(4)(a)	List explicitly the categories of waste that may be treated; using the European Waste Catalogue ("EWC") including information on the quantity of waste where appropriate.	Condition 2.3.3 and Table S2.2 in Schedule 2 of the Permit
4(4)(b)	Permit shall include the total waste incinerating capacity of the plant	Condition 2.3.3 and Table S2.2 in Schedule 2
4(4)(c)	Specify the sampling and measurement procedures used to satisfy the obligations imposed for periodic measurements of each air and water pollutant.	Conditions 3.5.1 and Tables S3.1, S3.1(a), and S3.2; also compliance with Articles 10 and 11
5(1)	Take all necessary precautions concerning delivery and reception of wastes, to prevent or minimise pollution.	- EPR require prevent or minimise pollution. - Volume 1 of the Application defines how this will be carried out. - conditions 2.3.1, 2.3.3, 3.2, 3.3 and 3.4
5(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Volume 1 of the Application describes procedures for the reception and monitoring of incoming waste
6(1)	(a) Slag and bottom ash to have Total Organic Carbon (TOC) is < 3% or loss on ignition (LOI) is < 5%. (b) Flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber. (c) At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas	(a) Conditions 3.5.1 and Table S3.5 (b) Pre-operational condition PO01. The Application specifies measurement point (c) Condition 2.3.7
6(2)	Relates to co-incineration plants	Not relevant
6(3)	Automatic waste feed prevention: (a) at start up until the specified temperature has been reached or if this temperature is not maintained (b) when the CEMs show that ELVs are exceeded due to disturbances or failure of abatement.	Condition 2.3.6
6(4)	Different conditions than those in 6(1) may be authorised	No such conditions Have been allowed
6(5)	Emissions to air do not give rise to significant ground level pollution, in particular, through exhaust of gases through a stack	Emissions and their ground-level impacts are discussed in the body of this document,
6(6)	Any heat generated from the process shall be recovered as far as practicable.	(a) The plant will generate electricity (b) Operator to review the

WID Article	Requirement	Delivered by
		available heat recovery every 4 years (Condition 1.2.1)
6(7)	Relates to the feeding of infectious clinical waste into the furnace	No infectious clinical waste will be burnt
6(8)	Management of the Installation to be in the hands of a natural person who is competent to manage it	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit fulfil this requirement
7(1)	Incineration plants to comply with the ELVs in Annex V.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a
7(2)	Relates to co-incineration	Not relevant
7(3)	Measured ELVs to be standardised in accordance with Article 11.	Schedule 6 details this standardisation requirement
7(4)	Relates to co-incineration	Not relevant
8(1) – 8(6)	All relate to conditions for water discharges from the cleaning of exhaust gases	There are no such discharges as condition 3.1.1 prohibits this.
8(7)	(a) Prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. (b) Storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting	The Application explains the measures to be in place for achieving the directive requirements
9	(a) Residues to be minimised in their amount and harmfulness, and recycled where appropriate (b) Prevent dispersal of dry residues and dust during transport and storage (c) Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction)	(a) Conditions 3.5.1 and 1.4.1 (b) Conditions 1.4.1, 2.3.1 and 3.2.1 (c) Condition 3.5.1 and pre-operational condition PO04
10(1) and 10(2)	Measurement equipment shall be installed and techniques used to monitor the incineration process, and that the measurement requirements shall be laid down in Permits	Condition 3.5.1, and tables S3.1 and S3.1(a), emissions to air, and table S3.4, process monitoring requirements
10(3)	Installation and functioning of CEMs for emissions to air and water to be subjected to regular control, testing and calibration	Condition 3.5.3, and tables S3.1, S3.1(a), and S3.4
10(4)	Sampling points to be specified in Permits	Tables S3.1, S3.1(a), and S3.4
10(5)	Periodic measurements to air and water to comply with Annex III, points 1 and 2	Tables S3.1, S3.1(a), and S3.4 specify the standards to be used. Condition PO02 requires a report from the Operator
11(2)	Continuous measurement of NO_x, CO, total dust, TOC, HCl, and SO_2 and periodic measurement of HF, heavy metals, dioxins and furans plus the measurement of combustion chamber temperature and concentration of O_2, pressure, temperature and water content of the exhaust gases	Condition 3.5.1 and tables S3.1, S3.1(a), and S3.4
11(3)	Verify the residence time and minimum temperature as well as oxygen content of	Pre-operational condition PO01

WID Article	Requirement	Delivered by
	exhaust gases	
11(4)	Periodic rather than Continuous measurement of HF if HCl is abated and limit values not exceeded	Condition 3.1.2 and table S3.1
11(6)	Conditional option of periodic measurement for HCl, HF and SO_2 instead of CEMs	Option not applied except for HF as per Article 11(4) above
11(7)	Reduction in the monitoring frequency for heavy metals, dioxins and furans under certain conditions, provided the criteria in article 17 of WID are available	Not applied as no such criteria available
11(8)	Sets out reference conditions for standardisation of measurements	Schedule 6 sets the same reference conditions
11(9)	Recording and reporting requirements	Section 4 and Schedules 4 and 5
11(10)	Sets out criteria for compliance with ELVs in Annex V	Condition 3.1.2 and tables S3.1, S3.1(a) and S3.4
11(11)	Specifies when ELVs apply, how averages are calculated (including the use of Annex III) and how many values can be discarded	Table S3.1 and condition 3.5.5
11(12)	Average values for HCl, SO_2 and HF to be determined as per Articles 10(2), 10(4) and Annex III	See Articles 10(2), 10(4) and 11(11) above
11(14) to 11(16)	Addresses the monitoring of waste water from the cleaning of exhaust gases	There are no such releases from the Installation.
11(17)	Competent authorities to be informed if ELVs are exceeded	Condition 4.3.1
12(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2
13(1)	Specify maximum period of unavoidable stoppages, disturbances or failures of purification or CEMs, during which air or water ELVs may be exceeded	Conditions 2.3.6 to 2.3.11
13(2)	Cease the feed of waste in the event of a breakdown	Condition 2.3.10
13(3)	Limits the maximum period under 13(1) above to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year	Condition 2.3.10.
13(4)	Limits on dust (150 mg/m^3), CO and TOC not to be exceeded	Condition 2.3.6 and Table S3.1(a)

ANNEX 2: Pre-Operational Conditions

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

Table S1.4 Pre-operational measures

Ref	Requirement	Reason for requirement
PO01	The Operator shall submit a written report to the Environment 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.	Verification required in accordance with WID Articles 6(1) and 11(3)
PO02	The Operator shall submit a written report to the Environment 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 monitoring of N_2O and NH_3 • monitoring locations, access and working platforms	Verification required in accordance with WID Article 10(5)
PO03	Prior to the commencement of commissioning the Operator shall provide a written commissioning plan for approval by the Agency. The plan shall include: • the expected emissions to the environment during the different stages of commissioning, • the expected durations of commissioning activities and estimated timeline for completion • the actions to be taken to protect the environment and report to the Agency in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved.	To ensure that there is a proper and structured plan to commission the plant, verified by the Environment Agency.
PO04	The Operator shall submit a written plan to the Environment Agency for approval detailing the ash sampling protocol to be used for APC residues and bottom ash, in conformance to Environment Agency Guidance. The plan shall be implemented in accordance with the Environment Agency's written approval	Required in accordance with section 4.3.9 above
PO05	The Operator shall submit a written site closure plan to the Environment Agency for approval in accordance with the requirements set out in Environment Agency Guidance.	Required in accordance with section 4.2.3 above

Table S1.4 Pre-operational measures		
Ref	**Requirement**	**Reason for requirement**
PO06	The Operator shall provide the Environment Agency with a written report for approval describing the detailed programme of noise and vibration monitoring that will be carried out at the site at the commissioning stage and also when the plant is fully operational (after phase 1 and after phase 2 of the development) as proposed in the Application. The report shall include confirmation of locations, time, frequency and methods of monitoring. The monitoring programme shall be carried out in accordance with the Environment Agency's written approval.	Required to demonstrate that the noise monitoring requirement in condition 3.5.1 will be carried out in the proper manner.
PO07	The Operator shall notify the Environment Agency in writing that an emergency spillage (including flood water and firewater arisings) management plan has been prepared and instigated.	Required, as described in section 4.2.2 above, to demonstrate that spillage management is a functioning procedure before the plant commences operation

ANNEX 3: Improvement Conditions

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

Table S1.3 Improvement programme requirements

Ref	Requirement	Reason for requirement
IC1	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission points A1, A2, A3 and A4 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 Environment Agency to carry out such tests and produce a report on the results. On receipt of written agreement by the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	As required in sections 5.2.3 and 6.7.3 above; to design and conduct an investigation into the particle size distribution of emissions from the stacks.
IC2	The Operator shall submit a written summary report to the Environment Agency to confirm by the results of calibration and verification testing whether the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	Required to demonstrate actual CEM performance is as required by BS
IC3	The Operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the exhaust gases in the furnace whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency.	Required to demonstrate actual furnace combustion performance is as required by WID
IC4	The Operator shall submit a written report to the Environment Agency which shall include: - a review of performance of the facility against the conditions of this permit. - details of optimisation of acid gas, dioxin and mercury emission abatement systems including reagent dosing rates. - details of optimisation of the NO_x emission abatement system; how the Selective Non Catalytic Reduction (SNCR) system and combustion settings are controlled to optimise NO_x and N_2O emissions whilst also maintaining optimised NH_3 emissions. - details of procedures developed during commissioning for achieving and demonstrating satisfactory process control and covering the range of designed operating rates.	Required to demonstrate actual plant performance is as required by conditions of permit and WID.

Table S1.3 Improvement programme requirements		
Ref	**Requirement**	**Reason for requirement**
IC5	The Operator shall carry out an assessment of the impact of emissions to air of Arsenic, Nickel and 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, Nickel and Chromium (VI) against the guidelines through the use of emissions monitoring data during the first year of operation and air dispersion modelling. A report on the assessment shall be made to the Environment Agency.	Required to demonstrate the impact of As, Ni and Cr(VI) on the environment and to check that the assumptions made in the assessment shown in section 5.2.4 above are realistic.
IC6	The Operator shall submit a written report to the Agency on the implementation of its Environmental Management System and the progress made in the accreditation of the system by an external body or if appropriate submit a schedule by which the EMS will be subject to accreditation.	Required in accordance with section 4.3.2 above, to mark the progress of the Operator in attaining EMS accreditation

ANNEX 4: Consultation Reponses

A) Advertising and Consultation on the Application

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

The Application was advertised on the Agency website from 5 November to 4 December 2009 and in the Runcorn and Widnes Weekly News on 5 November 2009 and the Liverpool Echo on 6 November 2009. In order to clarify the locations of where the Application could be seen during the consultation period, the advertising was repeated on the Agency website from 7 January to 4 February 2010 and in the same newspapers on 7 January 2010. Copies of the Application were placed in the Agency Public Register at the Environment Agency Appleton House office in Birchwood, Warrington and the Halton Borough Council Public Register at initially the Municipal Building, Widnes and subsequently in the Halton Lea Direct Link office, Runcorn. Additionally copies of the Application were placed at the Runcorn Direct Link office in Church Street, Runcorn and at libraries in Runcorn (Egerton Street and Halton Lea Libraries), Frodsham (Rock Chapel Library) and Widnes (Victoria Square Library)

The following statutory and non-statutory bodies were consulted:

Halton Borough Council Environmental Health Department
Food Standards Agency
Natural England
Halton and St Helens Primary Care Trust/Health Protection Agency
Health & Safety Executive

1 Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from **Halton Borough Council Environmental Health Department (dated 24/11/09)**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
The standard Agency form concerning Planning and Nuisance was returned completed. It confirmed that there were planning conditions relating to noise but there was no history of noise complaints in the past three years.	The Agency standard conditions for noise management are considered adequate and will not compromise the requirements of the Planning Consent.
A copy of the Halton Unitary Development Plan relating to this area was also submitted.	This document was considered as described in section 7.1.2 above.
A copy of the Planning Consent issued by the Dept for Business Enterprise & Regulatory Reform (BERR) was also submitted.	This document was considered as described in section 7.1.2 above.

Response Received from **Primary Care Trust and Health Protection Agency (dated 13 May 2010)**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No significant health impacts were identified during the construction phase.	No action.
A recommendation made regarding future monitoring in the local environment to assess social health issues	Whilst we will be requiring monitoring to ensure that the environment and human health are protected, the recommendation relates to wider issues outside the scope of EPR.
A query was raised about the basis of a hazard quotient used by the Operator in the Application.	No further action. The Operator confirmed the basis of the quotient was as the PCT had understood it.
A recommendation was made to model the emissions at actual levels rather than at design levels.	No action. The design levels were set at the WID limits. As these were shown to result in acceptable impact, modelling at lower levels was not considered reasonable.
A request made to require continuous monitoring on stacks, and to make results available.	No further action; monitoring will conform to WID requirements. Results of monitoring will be placed on the public registers, one of which is at Halton Borough Council.
The HPA concludes that typically, a well-managed and well-regulated Energy from Waste Facility presents little risk to local residents. HPA refers to its position statement that concludes: "Modern well managed incinerators make only a small contribution to local concentrations of air pollutants. It is possible that such small additions could have an impact on health but such effects, if they exist, are likely to be very small and not detectable."	No further action

Response Received from **Natural England (dated 17/08/10)**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No issues raised; In respect of the Appendix 11 (Habitats) submission, Natural England agreed with the Agency conclusions that there was little likelihood of environmental damage. In respect of the notification that we had concluded, in the Appendix 4 (CROW Act) form, no likely impact on the SSSI, there was no response.	None required

Further response from **Natural England (dated 08/11/10)**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Concerns were raised re the need to consider the deposition of dioxins, heavy metals and PCBs from the proposed incinerator on the Mersey estuary. Natural England agreed with this conclusion in their email of 18 November 2010.	We examined the data supplied by the Applicant and concluded that the emissions were not likely to cause significant harm to human health or the environment. The detail of our examination can be seen in section 5.4.

No Response Received from **Health & Safety Executive (HSE)**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
None	

Responses Received from **Food Standards Agency (FSA) (several dates between September and November 2010)**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
On 17 September 2010, FSA initially indicated a number of concerns: • Predicted dioxin and furan human intake compared to the COT-TDI considering potentially high background dioxin intake. • Model validation. • Dioxins and furans potentially entering the food chain at Frodsham Score. • The contribution of dioxins and furans to food contamination thresholds. • Supplementary questions. On the basis of these concerns they were unable to say with any confidence that the proposed operation will not have an adverse effect on the safety of the food chain.	We examined the data supplied by the Applicant and concluded that the emissions were not likely to cause significant harm to human health or the environment. We submitted our assessments to FSA for their further consideration The detail of our examination is shown in section 5.3.2.1 (Consultation on health risk issues) of this document.
After further deliberation the FSA concluded that they had no concerns.	

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

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

Guidance on the interaction between planning and pollution control is given in PPS23. It says that the planning and pollution control systems are separate but complementary. We are only able to take into account those issues, which

fall within the scope of the Environmental Permitting Regulations. The way in which we have done that is set out below.

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

A notification was received from Hale Bank Parish Council indicating that they would be making a formal objection. No further communication was received.

A letter was received from Councillor Peter Murray of Halton BC on 7 November 2009 requesting an Environmental Justice audit referencing a study by Halton BC "Understanding the Health of Halton" carried out in 2003, which looked into the factors affecting the health of people within the local community. Our view on this is that there already has been a study – the Halton study – and a wider study is not justified in respect of a single application.

b) Representations from Community and Other Organisations

A representation was received from Halton Liberal Democrats. The issues raised were also raised by others and are addressed in the following tables.

Several representations were made by the local group known as Halton Action Group Against The Incinerator (HAGATI). There was some duplication in some of the responses and the issues have been addressed in the most appropriate place and not repeated. The responses were very detailed. They have been fully considered but it is only practicable to summarise the main points raised in this annex. The complete responses from HAGATI are on the public register. As the submissions were made in response to the Application many of the issues raised have been addressed in detail in the main body of this document as part of our normal determination process rather than being addressed in this annex. In addition, some issues were concerned with Planning or aspects not related to the determination of this permit and have not been included in the following summary.

HAGATI Part 1: Response to the Health Impact Assessment (dated 04/02/10)

(page references are to HAGATI's document)

Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Lack of breadth in the scope of the assessment such as no references to various known health issues in the area (p5).	We have assessed the health impacts fully in the main body of this document. We are satisfied with the assessment submitted. The HPA have also assessed the submission and are content that the impact will not be significant. HPA also received a copy of this HAGATI response and made no further comments.
HAGATI noted that a DEFRA report has identified dioxin contamination at two heronries in the Runcorn area (p6).	This is discussed in section 5.4.
Fate of water added to quench hot boiler ash before it is sent off site for disposal (p7).	A schedule 5 request for information was asked of the Applicant to clarify this point. Clarification was given as follows:

Brief summary of issues raised:	Summary of action taken / how this has been covered
	Bottom ashes are quenched by submerging them into a water basin. The ash is removed from the quench bath via an inclined conveyor where excess water will drain from the bottom ash and is returned into the quench bath. Further moisture will be lost via evaporation. The residual moisture will remain in the bottom ash to ensure it remains damp. In the event that excess water is carried over within the bottom ash and accumulates in the bottom ash bunker a mobile pump would be used to remove the water and this would be returned to the quench bath for re-use. It is considered unlikely that bottom ash would become dry enough to give rise to dust. However should this arise the ash would be dampened using a water spray. We are satisfied that there is adequate water and dust control in ash handling. However if a problem should arise we are in a position to require additional remedial measures.
HAGATI has indicated a major source of concern over noise caused by trains (p7)	Our assessment is discussed in section 6.5.5. We agree with the assessment carried out by the Applicant and that noise from the trains within the Installation is not likely to cause annoyance during the day or night.
A number of recommendations are made by one contributor concerning lack of information, errors in fact, need for additional health effects studies, sociological studies, risk perception considerations, pollution modelling grid size and the effect on property values (summary, p18).	Much of the health and sociological study recommended is fundamental research and beyond the scope of such an Application. HPA have assessed the submission and are content that the health impact will not be significant. Aspects such as effects on property values are not within the scope of the determination. In respect of the pollution modelling grid size, the Agency agrees that the size used by the Operator (300m squares) is probably too large; we recommend a grid of at most 150m (1.5 times the stack height, 105m in this case). The Applicant carried out sensitivity modelling (described in Appendix C2 of the Application) in a 4km square between receptors using a 50m grid and an updated dispersion model. They concluded that the new model predicts a significantly lower impact than the old model and that the finer grid size predicts negligible increase in impact. In validating the dispersion modelling aspect of the Application, we used a grid of 130m.
HAGATI highlighted some apparent discrepancies in the number of truck movements; different parts of the Application appeared to specify different volumes of transportation (p23).	A schedule 5 request for information was asked of the Applicant to clarify this point. Clarification was given; some differences occurred as the result of early assumptions about transport movements and plant capacity being revised as more information became available; others involved typographical errors. The response includes a summary table comparing the original Transport Analysis with the revised quantities of materials specified within the EPR Application. The full response dated 11 June 2010 to the schedule 5 notice is on the public register. The conclusions of the Applicant's assessment were not changed as the result of the additional information.
HAGATI highlighted that there was a new housing development ("Evolution") that was not included in the impact considerations (p24).	A schedule 5 request for information was asked of the Applicant to clarify this point. Clarification was given as follows: *Although the new Evolution scheme located on Percival Lane was not specifically identified as a sensitive receptor, its location is close to receptors considered as part of the air quality assessment, Human Health Risk Assessment and*

Brief summary of issues raised:	Summary of action taken / how this has been covered
	the Health Impact Assessment, most notably Riverside 6th Form College and Westfield Primary School neither of which are predicted to be subject to significant effects. Its location approximately 1 km from the site is considered unlikely to be subject to noise or vibration effects from operation of the facility. Our own assessment indicates that this is reasonable. In addition we are requiring further noise surveys during and after commissioning (see PO06 in Annex 2).
HAGATI highlighted that there was no mention of noise from the cooling towers (p25).	Cooling Tower noise was always included in the assessment (in Appendix D3). The Applicant subsequently submitted an updated noise assessment (dated 14/05/10) which is on the public register and included revised data from the cooling tower manufacturer.
HAGATI make a number of points about other noise issues (p26).	It can be confirmed that Agency assessment has taken all the aspects raised into account.
HAGATI expect that the requirement to publish health and emission data will be included in the permit (p28)	Only reporting of monitoring issues concerned with the plant operation have been included in permit conditions. Health impact monitoring will not be included as this is a wider issue that would also cover matters beyond the scope of the determination.
HAGATI is concerned about the risk of dioxins entering the food chain (p30)	This aspect is considered in section 5.3.2.1. We consider that the impact on the food chain is not significant. FSA agree with this conclusion
HAGATI makes a number of points regarding, BAT, odours, dioxin and particulate emissions. (p30, 31).	These are all EPR and WID considerations and the permit requires compliance to those standards. This is discussed in the main body of this document.
HAGATI is concerned about mercury emissions (p32).	The mercury content of waste is expected to be very low having been treated, before it arrives on site, to remove solid contaminant of this nature. Emissions will be correspondingly low and shall conform to WID, and permit, limits.
HAGATI is concerned about the choice of source data for background levels of dioxins and heavy metals being not very close to the EfW plant (p33, p36).	Unfortunately information relating to locations closer to the site does not appear to exist. However it has been demonstrated that the impact of these substances on the environment is insignificant and therefore the contributions to the background is also considered to be insignificant. See section 5.3.2.1.
HAGATI is concerned that the weather conditions, local geography and topography will distort the environmental impact of emissions (p34).	We can confirm that the Applicant has assessed the impact of the emissions taking into account the local features using weather data that covers all directions and that the Agency has verified the assessment.
HAGATI is concerned about the structure of the stack (p35).	A schedule 5 request for information was asked of the Applicant to clarify this point. Clarification was given as follows: *At the time of the original planning application (March 2007) the technology to be used at the facility was not confirmed, and as a conservative assumption the planning application was prepared on the basis of Circulating Fluidised Bed (CFB) technology as this would give the larger building size. However, since the planning application was made the technology to be used has been revised with Moving Grate (MG) now being preferred. The update of preferred technology has resulted in a change from three CFB units to four MG units and the resulting increase in the number of flues in the stack. We confirm that there are continuous*

Brief summary of issues raised:	Summary of action taken / how this has been covered
	emissions monitors for each of the four flues.
HAGATI asks why the maximum particulate emission concentration does not lay in the direction of the prevailing wind (p35).	We have confirmed that the air quality assessment has been carried out correctly and the values indicated are not unexpected.
HAGATI ask whether N_2O has been adequately considered and cite greater issues when the incinerator temperature falls below 850^{o}C and urea is used for the SNCR reagent (p35).	It is not anticipated that the temperature will fall below 850^{o}C as auxiliary burners will operate automatically to maintain this as a minimum temperature. Ammonia is the reagent for SNCR on this incinerator. N_2O released as a function of SNCR has been assessed as a factor in Global Warming Potential. SNCR is considered to be BAT in this situation. There is a requirement to monitor N_2O continuously in the permit. Improvement condition IC4 requires that the Operator reports on optimisation of SNCR operations during commissioning.
HAGATI have commented about the harmfulness of very small particulates and are concerned about the interpretation of the windroses (p36).	We have assessed the particulate emissions in section 5.3.4. The assessment of air dispersion takes into account all wind directions and the frequency of occurring at each direction.
HAGATI make 15 recommendations for further examination (p37).	• The majority of the recommendations (#1, #2, #3, #6, #7, #8, #9, #10 and #13) are concerned with obtaining more information about health impacts. HPA have reviewed the Application and deemed that no significant health impacts were identifiable. In addition HPA were invited to comment on the issues raised by HAGATI in this response. They made no further comments and we are satisfied with the health risk assessment and conclude no further action is required. • Two items are aspects of the Planning decision (#4, #15) and are not considered here. • Item #5 (particulate emissions) is addressed in part by improvement condition IC1 which requires the assessment of the size distribution of actual emissions. • Item #11 (DEFRA study) cannot be undertaken in terms of this determination. • Item #12 (fly ash handling) has been addressed in the response to the p7 HAGATI query above. • Item #14 (air modelling grid size) has been addressed in the response to the p18 HAGATI query above.

HAGATI Part 2: Response to the environmental Permit Application (dated 05/03/10)

(section and page references are to HAGATI's document)

Brief summary of issues raised:	Summary of action taken / how this has been covered
<u>Section 1 Objection overview:</u> This provides an overview of points which are then picked up in latter sections. Other topics in this section are discussed in the references as shown: • The Noise Nuisance:	• The Noise Nuisance: see "HAGATI Part 1" above.

Brief summary of issues raised:	Summary of action taken / how this has been covered
• The Health Impact Assessment	• HIA: see "HAGATI Part 1" above.
Section 2 Environmental Justice: HAGATI suggests an EJ Audit is required (p11)	There are no plans to carry out this type of audit and there is no requirement in order to determine this Application. It is confirmed that the in-combination effects of this incinerator and the Ince Marsh Incinerator have been included in the assessment and we conclude that any combined effect is insignificant (see section 5.6).
Section 3 Chimney height (p16): HAGATI is querying the height of the stack and dispersion of emissions.	It is confirmed that Agency has assessed the stack height, year-round weather conditions and topography and is satisfied that the modelling is representative and the impacts not significant.
Section 4 Size of development (p26): HAGATI is querying the magnitude of the pollution, ash contamination, the capacity of the plant and whether LCPD applies.	Capacity of the plant is mainly a Planning Decision issue. Environmental Permitting is concerned with whether the impact of emissions is acceptable and we consider they are in this case. LCPD does not apply to this incinerator. In respect of total pollution loading, the dispersion of air-borne material has been assessed and bottom ash is to be quality monitored and disposal controlled.
Section 5 Existing Industrial Pollution (p29): Questions raised about safe emission limits, soot blowing, monitoring, baseline testing of residents, mercury and farming.	All emissions will be compliant with WID limits. A schedule 5 request for information was asked of the Applicant to clarify the point about soot blowing. Clarification was given as follows: *There are two de-dusting operations undertaken within the plant: boiler tube rapping and bag filter cleaning. Boiler tube rapping is undertaken to minimise fouling of the boiler tubes and the majority of particulates removed during these operations will be collected within the boiler ash system. Any particulates entrained in the flue gases will be removed within the filter bag system. It should be noted that cleaning operations are carried out bundle by bundle and not all at once avoiding excessive particulate loads. Similarly the cleaning operations within the bag filter unit are phased with cleaning undertaken row by row with the remaining filter units in normal operation. The plant is designed to guarantee compliance with WID particulate limits during these operations.* We are satisfied with this clarification. We do not consider farms or allotments will be adversely affected by this operation. FSA agree with this conclusion. The health impacts of the proposals including ingestion have been considered in section 5.3. Emissions will be monitored in accordance with the requirements of WID. The HPA concludes that typically, a well-managed and well-regulated Energy from Waste Facility presents little risk to local residents. Testing of residents for baseline levels of contaminants is therefore unnecessary and we do not have the power to require it in any event. In respect of mercury emissions, all the incoming

Brief summary of issues raised:	Summary of action taken / how this has been covered
	waste is sorted before it arrives on site to remove such materials as batteries and mercury vapour lamps. There is expected to be some rogue mercury entering the incinerator system. The flue gas treatment system includes two stages of the injection of activated carbon to remove mercury from the gas stream. The permit includes a limit for the concentration of mercury releases set at the WID limit and an improvement condition, IC4, to report on the optimisation of the treatment system during the commissioning of the incinerator.
Section 6 Filters and Abatement – temperature control (p32): General concerns about filtration efficiency and maintaining combustion temperature.	WID includes strict temperature control requirements. Auxiliary fuel burners are automatically started to maintain the temperature above 850^{o}C. The permit requires that waste incineration shall stop if the specified temperature is not maintained. We are satisfied that the use of fabric filters is adequate for the abatement of particulate matter to the standards of WID (see section 6.2.1). Agency will maintain a high level of compliance monitoring
Section 7 Fuel – variations (p34): General concerns about the variability of waste being burned.	HAGATI has some misconceptions about the waste being used for this incinerator: it is treated in that certain materials are removed before it is despatched to site. The waste is to conform with the EWC codes listed in the permit so there will be none of the items HAGATI is concerned about. Condition 2.3.3(c) is included in the permit to prevent separately collected material suitable for recycling being accepted. Minimum combustion conditions are specified by WID. Mercury vapours are captured by the activated carbon injected as part of the flue gas treatment system (see section 6.2.6) and this is considered to be BAT. IBA will be tested at the frequency specified in the permit and is considered by Agency to be adequate. See also section 4.3.9. Other concerns are related to waste suppliers and waste strategy issues. The Installation is to deal with residual waste arisings and it can safely deal with the permitted waste types.
Section 8 Transportation (p36): General concerns about noise and volume.	The noise issues of road and rail traffic inside the installation boundary have been assessed by Agency as part of the determination. See also, section 6.5.5. Bangs, crashes and clatters were included in the assessment. We agree with the Applicant's conclusions. The volume of road and rail traffic outside the installation boundary is a Planning Decision issue. Off-site conditions, as proposed by HAGATI, are not appropriate in this situation as the Applicant is not responsible for the rail Operators.

Brief summary of issues raised:	Summary of action taken / how this has been covered
Section 9 Carbon emissions (p38): General concerns about the level of carbon emissions and the effects on climate change.	Carbon emissions are given as 872 ktpa in the Application. Carbon emissions are discussed in sections 6.1.2 and 6.3 above. Other aspects relating to carbon capture and storage (CCS) are not relevant to this Application. CCS requirements are only indicated for combustion units that use primary fuels (gas, oil, coal), to prevent increasing the amount of CO_2 (and methane) in the air. Incineration processes burn waste which would have released CO_2 in any case – from a landfill or other forms of waste treatment.
Section 10 Accident Risks (p39): General concerns about emissions resulting from accidents and emergency shut downs.	There are strict WID requirements regarding the plant capabilities under emergency/ abnormal situations. HPA have assessed the emissions as having no significant effect. See also, section 4.3.4
Section 11 Air quality (p40): Concerns about the quality of air in the local environment.	Agency has assessed the emissions and have concluded there will be no significant impact. Background concentrations of the major pollutants measured at Runcorn Town Hall have been used by the Applicant. Sources of information of the background concentrations of other pollutants are also given by the Applicant. We consider this to be acceptable. It can be confirmed that start up and shut down operations are in fact regulated under WID.
Section 12 Emissions (p43): Concerns about the emissions of particulates and metals on community health; in particular was the community assessed as an “at risk population” and was the vulnerability to small particulates quantified?	The community has not been assessed as an “at risk population”. This is not considered necessary in view of our conclusions on health impact. The HPA has also assessed the Application and concluded there will be no significant effects. As part of their assessment HPA assessed the emissions to air of PM_{10} and $PM_{2.5}$. Particulate sizes lower than this were not specifically assessed. However their September 2009 statement (see section 5.3.4 above) 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. We consider particulates smaller than $PM_{2.5}$ in section 5.3.4.
Section 13 Existing Air quality (p47): Further comment about the mercury levels in the incoming waste and proper dispersion from the stack	Mercury vapours are abated by the injection of carbon and emission levels are expected to be negligible, not exceeding WID requirements. There is no reason to believe the stack will not perform satisfactorily.
Section 14 HIA (p48): Already covered in “HAGATI Part 1” above	---
Section 15 BAT (p49): Questions are asked regarding the technology used, emissions and carbon balance (and specifically asking if an EfW in Peterborough is	Carbon capture has been discussed above. In respect of the Peterborough EfW, this is a development project for a technology which has not yet been proven. In this situation the technology

Brief summary of issues raised:	Summary of action taken / how this has been covered
installing a CC system, why is INEOS not doing so)	cannot be said to be "available" in terms of BAT and is therefore not included in the INEOS project. Operator's choice of furnace technology was assessed in relation to our Guidance and the European BREF note in section 6.1.1 above. We agree that the package of plant comprising moving grate, boiler, gas abatement etc represents BAT. We are determining an application for an incineration activity so we can only assess alternative forms of incineration technology. This has been done in S6.1.2 in respect of carbon emissions A schedule 5 request for information was asked of the Applicant to clarify the point about the carbon balance. Clarification was given as follows: *The carbon dioxide emissions were estimated as follows:* *Exhaust gas flow rate per line = 211,275 kg/hr* *CO2 content = 12.9 m%* *Mass CO_2: 211,275 kg/hr x 12.9 m% = 27,254 kg/hr CO_2 = 27.25 tonne/hr* *27.25 ton/hr x 8000 hr/year = 218,000 tons/year of CO_2 per line.* *For 4 lines* *Total CO_2 emission 218,000ton/year x 4 = **872,000 ton/year of CO_2.*** *This figure assumed that all of the carbon is oxidised to carbon dioxide i.e. no carbon monoxide is formed and no carbon goes into the ash. It is therefore considered to be a conservative estimate.* Carbon offset is discussed in section 6.3 above. The types of incoming waste is regulated by EWC codes. It is not anticipated that emissions will breach the WID limit requirements.
Section 16 The Stockholm Convention (p53): There is concern that the provisions of this Convention are not being met and that BAT is not being achieved.	This issue is discussed in detail in section 6.4 above and shows how the Convention is complied with as part of our permitting process.
Section 17 Randle Island (p64): Concerns about the disposal of waste from the EfW plant at Randle Island L/F.	This is not relevant to this permit. However condition 1.4 requires waste to be disposed of in a way that minimises its impact on the environment and it can only go to sites permitted to accept it.

HAGATI Part 3: Response to Appendices to the Environmental Permit Application (dated 05/03/10)

(page references are to HAGATI's document)

Brief summary of issues raised:	Summary of action taken / how this has been covered
Appendix C Air Quality (p4): Several apparent errors in the Application have been highlighted.	We have checked the issues and assessed that there is no change to our conclusions. We have assessed plume visibility and concluded there will not be a significant effect on the environment. There is no significant difference between BAT and BATNEEC.

Brief summary of issues raised:	Summary of action taken / how this has been covered
A question regarding the effects of operating the plant at lower than design loads was asked.	Weston Point Power Station has been shut down for several years and there is no mutual impact. Other comments regarding emissions, dispersion and technology have been discussed in the main body of this document. The question regarding the impact of operating the plant at lower loads was asked as a schedule 5 notice request for information. The response was received on 14/06/10: the plant is not designed to, and will not, operate at throughputs less than 70% of maximum; At 70% loading there will be no increased ground level concentrations of any pollutant; 100% loading represents the worst case scenario. We agree with this assessment (see section 5.7).
Appendix D Noise (p7): A number of objections are made because of the likelihood of noise from the site.	Noise during construction and outside the installation boundary is regulated by local authority. Noise from inside the Installation (including transport) has been assessed by Agency as being not likely to cause additional reason for complaint (see section 6.5.5).
Appendix E HHRA (p12): There are detailed concerns about the health effects of certain pollutants, thallium and vanadium, that HAGATI believe are not adequately considered.	In their response (see summary in Annex A(1) above) HPA identified that thallium and vanadium are emissions from the incinerator and are therefore included within the scope of their conclusion. This item of response from HAGATI was sent to HPA for additional consideration. They made no response so Agency concludes that the original conclusions of HPA are unchanged. Our conclusions on the health impact are set out in section 5.3.
Appendix F Habitats Assessment (p18): Concerns raised about the effects of the emissions on local wildlife conservations sites.	Agency has confirmed that the emissions will have no significant effect on any of the conservation sites in the vicinity of the plant. The Applicant submitted additional information concerning Local Nature Reserves and Wildlife sites, concluding that there is no significant effect from the EfW plant. We have reviewed this information and agree with the conclusion. The visual impact concerns are Planning matters.
Appendix I Site condition report (P22): A concern is raised about the volume of water discharged to the canal. There is also a concern about remedial work at the site, and the local impact.	The water discharge to the canal is very small in context (60 m^3/h maximum) and is not considered to be of concern. The quality requirements in the permit for the discharge are defined in Table S3.2 in the permit. Remedial work carried out as part of the construction activities is not the subject of this permit.

HAGATI Part 4: Addendum Issues (dated 24/05/10)

(page references are to HAGATI's document)

Brief summary of issues raised:	Summary of action taken / how this has been covered
1 dioxin pollution on Frodsham Marshes (p4): Concern expressed about some areas of impact	The maximum dioxin emission is known – the WID limit 0.1 ng/m^3. This value has been used in

Brief summary of issues raised:	Summary of action taken / how this has been covered
not considered by the Application.	assessing the dispersion all around the plant (as per the dispersion modelling methods) and it was concluded that there is no significant effect on any receptor. The detail of our examination is shown in section 5.3.2.1. FSA have responded to the consultation and their comments are summarised in Annex 4(A)(1) above; they agree with our conclusions.
2 Flood management plan (p7): Concerns about flood risk at Randle Island	Randle Island is not the subject of the permit.
3 Mercury poisoning in the Mersey Estuary SSSI (p7): Concerns about the levels of mercury in river sediments	Incoming waste is classified as non-hazardous and by definition contains no, or very low, levels of mercury. All waste is treated before it gets to Runcorn to remove, amongst other items, mercury containing light fittings and batteries. There are no releases of process water (ie water with any potential to contain mercury) to controlled waters. All combustion gases are treated with activated carbon, a traditional treatment to capture mercury in gaseous form. We agree with the Applicant that the emissions of mercury are not likely to exceed the WID limit. Any residual mercury contribution to the environment will be insignificant.
4 Issues relating to noise (p8): The noise policy statement for England has been described as filling some of the gaps in the noise regulation.	The noise policy statement is not compulsory guidance. The statement does not change BAT and Agency is satisfied that BAT is being applied (see section 6.5.5).
5 Pollution autism etc (p10), 6 Mercury poisoning etc (p11): Concerns raised about mercury poisoning.	Mercury emissions are considered above.
Other issues (p12): 10 aspects concerning the Planning Decision are raised.	These are not part of the determination process.
BAT New developments (p13): A question about new technology – gasification.	The Agency is satisfied that the proposals are BAT. See also **The Use of Alternate Technologies**, below

HAGATI Letter: Additional Issues (dated 23/08/10)

Brief summary of issues raised:	Summary of action taken / how this has been covered
HAGATI is concerned that a proposed application by INEOS Chlor Limited to the local authority to change the ratio of road to rail deliveries (increasing road traffic) will affect the environmental impact.	See the item concerning road/rail ratio in the following table.
HAGATI is concerned that the plastic content of waste will not be removed at source, as part of the treatment.	See the first item in the following table.

HAGATI Part 5: Further Addendum (dated 15/10/10)

(section references are to HAGATI's document)

Brief summary of issues raised:	Summary of action taken / how this has been covered
Section 2: plastics content of incoming waste: HAGATI is concerned that in order to ensure a purchase specification is consistently adhered to, the waste supplier may dope, or not remove, the waste with high CV material (eg plastics) when that material could be reused or recycled. This would be acting contrary to the hierarchy of waste disposal. In addition, greater quantities of plastics in the waste would increase the formation of POPs.	Any waste supplier is required to conform to the hierarchy of waste disposal as a condition of their permits. The operation of the facility producing the RDF is outside the scope of this Application. However we have modified condition 2.3.3 of the permit to include sub-paragraph (c): *Waste shall only be accepted if:* *c) when separately collected for recycling, it is contaminated and otherwise destined for landfill.* This modification acknowledges that some waste collected for recycling or reuse may be so badly contaminated that it cannot be so disposed and that if incineration was not available it would only be disposed of by landfill. Waste not so badly contaminated to prevent its recycle/reuse cannot be accepted at this facility. Waste may be best separated at source i.e the kerbside but this is a matter for the waste collection authority. Other countries have both high levels of recycling and high levels of incineration. In respect of POPs formation, the emission limit values in the permit are protective of the environment.
Section 3: Dioxin levels in the locality of the facility: HAGATI is concerned that the Application contains no information regarding the background dioxin levels and therefore the additional impact of the contribution from the incinerator cannot be assessed.	There does not appear to be any data describing local levels of dioxins in the local environment. However, we assessed that the additional impact of the dioxin contribution from the incinerator was insignificant in respect of human health, land contamination (for food uptake and food contamination levels) and estuarine silt. Both FSA and Natural England agreed with this conclusion. These aspects are considered in detail in sections 5.3 and 5.4.
Section 4: The Stockholm Convention: HAGATI observes that amendments have been made to the EU Regulation on POPs made on 26/08/10. HAGATI notes that Agency needs to be satisfied that the operation will not breach the amendments.	We are satisfied that our decision addresses issues relating to the Stockholm Convention, as described elsewhere in this document.
Section 5: The proximity of Liverpool John Lennon airport (LJLA) - Chromium VI: HAGATI is concerned about the lack of information regarding the impact of chromium VI in the environment; in particular what is the environmental background concentration	General air quality monitoring and data collection is a matter for the local authority Currently there are no validated monitoring standards that can be used to measure chromium VI (CrVI) emissions. However, as described in section 5.2.4, we have some indicative CrVI analysis from baghouse dust from MWI plant. These indicate a mean CrVI proportion to total Cr of 0.7%. We also know the typical chromium emissions from incinerator plant and a predicted worst-case ground level concentration in Runcorn. Using these data, we predict an insignificant PC at the location of peak human exposure in Runcorn. There is an improvement condition in the permit requiring the Operator to measure CrVI in the

Brief summary of issues raised:	Summary of action taken / how this has been covered
	emission.
Section 5: The proximity of Liverpool John Lennon airport – Wake Vortices: HAGATI is concerned that an effect of the proximity of LJLA is that the vortex wake of aircraft overflying the incinerator stack emissions plume will distort the air dispersion characteristics of the plume and create a worse impact on the ground than predicted.	We considered three main aspects as to whether or not a significant negative impact is likely: • Whether the aircraft fly low enough to affect a plume at all • Whether the flight-path would result in any contact with the plume • The frequency of any contact between aircraft and the plume. The Applicant supplied a number of LJLA documents relating to the flight-path details giving the location and height of the John Lennon flight path. They state that the typical flight-path is approximately 1 km north of the site and that aircraft altitude is a minimum of 300 metres at this point and that the typical approach bearing is 269 degrees. An approach of this bearing of is unlikely to affect dispersion across Runcorn itself and receptors to the west such as Frodsham Score. The risk of aircraft affecting peak air quality impacts in those locations is therefore low. The most sensitive receptors to dioxin intake to the north of the plant have been given further consideration. Dispersion modelling indicates that with an emission height of 105 metres, the plume is likely to rise to a maximum height (including spread) of around 300 metres. For the majority of hours, the plume height is lower than this. It is the more unstable meteorological hours or lower plume heights that are likely to give rise to the higher predicted pollution hours. The lower plume heights are not likely to interact with aircraft to cause additional pollution. For the hours where the plume height is at the ground-level impact is likely to be the least. On the issue of frequency, the Applicant provided air traffic movements data for 2000 and 2008. There are two main runways at the airport; numbers 09 and 27. The Applicant has reviewed the flight-path data and advises that in their opinion it is only commercial aircraft landing on runway 27 and departing on runway 09 that could potentially affect dispersion; a total of 15000 movements per year (average of <2 per hour). The LJLA flight-path data is consistent with this view although neither the Applicant not the Environment Agency are experts in this field. Based on the data provided, if there is interaction between aircraft and the plume, during hours when the plume is at its highest, it would take place for only a few seconds during those hours. This in our opinion would be unlikely to have a significant effect on ground-level pollution. We therefore conclude that a detailed study on the impact of aircraft vortices on dispersion is not required to support the permit Application.

Brief summary of issues raised:	Summary of action taken / how this has been covered
Section 6: Possible changes to the road/rail ratio: HAGATI is concerned that the Applicant may wish to change the ratio of road to rail deliveries contrary to the specifications of the Planning Permission.	This is not within the scope of the Application as it is a planning matter. If the operator wishes to change the ratio of delivery methods from that currently authorised under the planning permission they will need to apply to do this. In addition a variation to the permit may be required if the impact on the environment is altered or if any operational controls in the permit need changing.
Section 7: Noise nuisance: HAGATI is concerned about noise nuisance levels and about whether an expansion to LJLA will have any effect	We have reviewed the Applicant's noise assessment and the conclusions are described in section 6.5.5. Expansion to LJLA is not the subject of this Application. We have received no consultation information since the original announcement of the LJLA expansion several years ago and believe the expansion is not imminent. We can only take account of the current ambient noise levels but that given the intermittent impact from aircraft we do not consider it would affect the noise assessment.
Section 8: Delivery by rail: HAGATI suggests that the Environment Agency has regulatory duties under the Railways Act 1993. They also point out some time definition disagreements.	We are not responsible for regulating the operation of the railway link but we are responsible for regulating emissions from the installation including noise. We are satisfied that the noise conditions in the permit are adequate to enable us to carry out those responsibilities. The time definition issues are a planning matter and outside the scope of this Application.
Section 9: Application of the Human Rights Act 1998: HAGATI observes that the Environment Agency is required to consider the HRA in its determination process.	It is our view is the site will not cause any problems which would be significant enough to infringe human rights.

c) Representations from Individual Members of the Public

A total of 16 responses were received from individual members of the public. All of the relevant issues raised have been considered above. Those issues that were not relevant for the permitting process concerned matters that are outside the Agency's permitting remit (see below).

d) Representations made at the Drop-In Events

The drop-in events were attended by about 70 persons in total, who were a mixture of local residents and representatives of the business community potentially impacted by the proposed facility. 12 attendees made written representations about the Application. All of the relevant issues raised were the same as those considered above. Those issues that were not relevant for the permitting process concerned matters that are outside the Agency's permitting remit (see section 3 below).

B) Advertising and Consultation on the Draft Decision

This section reports on the outcome of the public consultation on our draft decision carried out between 3 February 2011 and 16 March 2011 and the public drop-in event held on 24 February 2011 at a recreation hall in Runcorn.

The Draft Decision was advertised on the Agency website from 3 February 2011 to 16 March 2011 and in both the Runcorn and Widnes Weekly News and the Liverpool Echo on 3 February 2011. Copies of the Draft Decision were placed in the Agency Public Register at the Environment Agency Appleton House office in Birchwood, Warrington and the Halton Borough Council Public Register at the Halton Lea Direct Link office, Runcorn. In addition, copies of the Draft Decision were available for downloading from the Agency website. Notice of the drop-in event for 24 February 2011 was advertised on the same Agency website and for the same period as the draft decision and in Agency press releases issued on 3 February 2011 and 22 February 2011.
In some cases the issues raised in the consultation were the same as those raised previously and already reported in section A of this Annex. Where this is the case, the Environment Agency response has not been repeated and reference should be made to section A for an explanation of the particular concerns or issues.

Also some of the consultation responses received were on matters which are outside the scope of the Environment Agency's powers under the Environmental Permitting Regulations. Our position on these matters is as described in section 3 below.

1) Consultation Responses from Statutory and Non-Statutory Bodies

No further representations were received from this group.

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

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

No further representations were received from this group.

b) Representations from Community and Other Organisations

Representations were received from HAGATI who raised the following issues.

Brief summary of issues raised	Summary of action taken / how this has been covered
EPR section reference classification: Incinerator or Power Station	
HAGATI believes the plant should be classified under EPR as a power station, S1.1 and not as an incinerator, S5.1.	In practical terms whichever classification had been used would have no significant impact on our determination. We consider S5.1 is the most apt classification. Agency guidance (developed after and not for the application as received) gives the same outcome because the incoming waste does not conform to a recognised specification. In the SoS letter accompanying the Planning Consent, it is clear that

Brief summary of issues raised	Summary of action taken / how this has been covered
HAGATI refers to correspondence prior to the application and believes that the public right to consultation has been compromised. HAGATI states that operating standards are lower for incinerators than for power stations and that regulation under WID significantly lessens protection and our ability to impose controls. HAGATI states the plant should be subject to the EU Emission Trading Scheme, EUETS. HAGATI believes that the quality of waste fuel for an incinerator is less than if it was for a power station and that for a power station the plastic content of the fuel would have to be removed. HAGATI believes a public enquiry has been avoided	the proposal has always been to burn waste and so the same considerations would have applied whether the incinerator was categorised as 1.1 or 5.1. It has always been envisaged it will burn waste and not a 'fuel' as such. Full consultation under EPR has taken place. Whether the project is 1.1 or 5.1 activity would not affect its ability to burn waste or detract from the requirement that the facility is subject to WID. Operating standards are very high for incinerators where WID and BAT must be complied with and, if necessary, techniques beyond BAT may be required. Standards are not lower for incinerators than for power stations. There is no restriction on our ability to impose controls. Incineration plants are also subject to the requirements of the Stockholm Convention on POPs. Under any classification, the plant would not be subject to EUETS as this is for natural fuels only – gas, oil, coal, not waste. Incoming waste is subject to restrictions on EWC Codes and it is non-hazardous. In the permit we have limited the incinerator to receive residual waste only. Plastics removal would be carried out in the same fashion under either classification, but the removal mechanism is not the subject of this permit. The INEOS proposal is for an incinerator which is not affected by the plastic content of the waste In respect of dioxin formation as the result of the plastics content, not all plastics contain chlorine and therefore cannot lead to dioxin formation and under WID, there are conditions limiting the dioxin emissions. The INEOS EfW has abatement plant to ensure compliance with those limits. The reference to avoiding a public enquiry relates to planning and is not relevant to our determination.
Stockholm Convention aspects	
HAGATI is concerned that amendments to aspects of the Stockholm Convention have not been addressed.	The regulations addressed in section 6.4 of the Decision Document (DD) are the current ones as amended.
Waste Framework Directive	
HAGATI has commented on the applicability of the WFD	Where the comments made by HAGATI relate to waste as an output from the incinerator we have addressed this in section 4.3.9 of the DD. Where the comments relate to waste as an input to the incinerator they generally fall within the scope of the planning authority or waste disposal authority and are not relevant to this determination

Brief summary of issues raised	Summary of action taken / how this has been covered
	We are satisfied that we have considered all the aspects of the WFD that are relevant to this determination in particular see section 7. Where HAGATI has referred to the application of the Precautionary Principle see annex 4(C) of the DD.
Responsibilities of Waste Disposal Authority (GMWDA)	
HAGATI believes GMWDA has a number of responsibilities in this process: under WID for the disposal of waste; off site monitoring; train noise; plastics in waste; choice of technology. HAGATI states there has been a lack of consultation on the GMWDA Waste plan.	References to GMWDA in the HAGATI response are not relevant to our determination of this application. The treatment plants have permits issued by the Environment Agency. GMWDA (or any WDA) is required to conform to the waste hierarchy but how they organise their collections and achieve compliance is not a matter for this determination. Consultation on the extent of the GMWDA waste plan is outside the scope of this determination. The SoS letter accompanying the Planning Consent simply acknowledged that INEOS would need to demonstrate BAT on the technology chosen for burning, ie moving grate. This has been done and is described in section 6.1.2 of the DD.
Mercury (Hg) in incoming waste	
HAGATI is concerned that there will be Hg in incoming waste, that it cannot be avoided and that it cannot be monitored at the intake. HAGATI want to know how the efficacy of the PAC system is to be assessed.	It is not claimed that there will be no Hg in incoming waste. Waste is treated at source to remove Hg, however it is inevitable that some will remain in the waste and we agree there is likely to be some in broken lamps. Waste containing Hg cannot be added at the treatment centre. Waste arriving at the INEOS plant is non-hazardous by classification. There is no monitoring of Hg at the plant intake. For any Hg arisings, and as described in the DD, the plant is equipped with Hg abatement to capture residual emissions. A WID limit applies on the emissions. Our experience with other MWI is that there are very low Hg emissions from the furnace which makes the abatement very efficient. As part of the commissioning programme required as a permit condition, IC4, the Hg abatement (with the other abatement) system is to be optimised. In the first year of operation there will be four test checks carried out and in subsequent years, two. We have the power to require additional testing if circumstances require it.
Activated carbon	
HAGATI is concerned about the quantities and use of activated carbon.	The annual consumption of PAC (Powdered Activated Carbon) is described in the application, p46, Table 2.4.1. The discrepancy in numbers is probably caused by a lack of early design data. We do not consider this to be a problem as the PAC consumption is calculated on the basis of expected dioxin formation and Hg evolution; INEOS will use what is required to ensure efficient abatement. The use of PAC is an established technique for this activity. The science can be researched in literature quite readily.
Energy	
HAGATI is concerned	The plant will generate up to about 86MWe but will use about 11

Brief summary of issues raised	Summary of action taken / how this has been covered
about the fate of energy generation from the plant.	MWe to run itself. This means that 75 MWe can be exported from this plant. It will usually be exported to INEOS Chlor Limited but if they are not able to accept, the National Grid can take it.
HAGATI is concerned about the interpretation of the plant loading constraints.	No incinerator is permitted to operate below 70% of the design CV loading; 120% thermal loading in two incinerators will therefore not be achievable without using natural gas to supplement the thermal load. This would be expensive and will presumably be avoided wherever possible by INEOS (this will be their decision).
Stack height	
HAGATI is concerned about the apparent lack of verification of stack height.	It is a Planning Consent condition that INEOS operate the plant in accordance with their planning application. The planning application described a stack height of 105 metres. If the impact of emissions from a stack of this height was significant we would have reason to require a change to the height (or planning condition). The impact of the maximum ground level concentration (mglc) of each pollutant has been shown to be, at most, "not significant" and we are satisfied with this conclusion.
Ash handling	
HAGATI is concerned that their question on ash handling was not addressed adequately.	We have fully assessed the ash handling at the plant. The HAGATI response referred to fly ash and flue gas residues but specifically queried fly ash. Neither term is used in the application, the permit or the DD. We have interpreted the term "fly ash" to mean the combined incinerator bottom ash and boiler ash both of which are likely to be non-hazardous (although, as explained in the Application, the boiler ash will have to be tested to check its hazard status). We have interpreted "flue gas residues" to mean air pollution control (APC) residues, which are hazardous. The HAGATI question specifically referred to fly ash, which we addressed in our earlier consideration. APC residues may or may not be made wet at the facility depending on the final destination. If it is to a recovery or treatment site it will be kept dry; if it is sent to landfill it may or may not be made wet depending on the arrangements at the landfill. As has been described in the DD section 4.3.9, the disposal has not yet been finalised. Disposal may only take place at a suitably permitted facility. While the disposal at Randle landfill is not the subject of this permit the landfill operates within a permit issued by the Environment Agency. All ash transfers will be made in sealed containers. Condition 1.4.1 of the permit requires that the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste by the activities; any waste generated by the activities is treated in accordance with the waste hierarchy referred to in Article 4 of the Waste Framework Directive; where disposal is necessary, this is undertaken in a manner which minimises its impact on the environment.
Dispersion modelling	
HAGATI has further concerns about: • Dispersion of particulates against prevailing wind;	Dispersion assessment takes into account all wind directions based on 5 years of met data at Liverpool airport (as described in DD). When detailed modelling has been carried out – as in this case – the dispersion factor is not required. The Application does not indicate where the location of the mglc is.

Brief summary of issues raised	Summary of action taken / how this has been covered
• Modelling under calm weather conditions; • The impact of the visible plume at Runcorn Hill has not been assessed. HAGATI is concerned about the heavy metal air dispersion assessment. HAGATI is concerned that CrVI is shown to have its mglc in the middle of the Mersey. HAGATI claims the modelling process is flawed.	We have checked their predictions using a range of met data and are satisfied that the PM_{10} impact is not likely to be significant anywhere (i.e. <10% of ST and <1% of LT EQS). As such, our opinion is that we do not need to see the applicant's PM_{10} isopleths. We do not consider this issue to be critical. In respect of the assessment of the impact of emissions under calm conditions we carried out additional assessment using the USEPA Calpuff model. Calpuff models predictions through a 3-dimensional meteorological wind field. USEPA advises using this model specifically (amongst other things) for light winds and calm conditions. We determined that the predicted maximum short-term predicted impact is higher than that using ADMS and AERMOD but not sufficiently high to affect our or the applicant's conclusions in this respect. The predicted long-term impact is consistent with both ADMS and AERMOD. We have conservatively used the higher of the three models for our audit checks. The visible plume length has been assessed and it will not reach Runcorn Hill which is 700 metres from the cooling towers and 600m from the stack. The application gives details of maximum visible plume lengths and we are satisfied they are reasonable. In respect of the heavy metal dispersion assessment, each of the nine group 3 metals cannot be released at 0.5 mg/m^3 because the WID limit is 0.5 mg/m^3 for the total. The selected method of particulate abatement is BAT and experience has shown this is satisfactory for maintaining below this level. The data for the information in the schedule 5 (#1) response was obtained from the National Atmospheric Emissions Inventory (NAEI) where no data for Sb, Co, Mn or V is recorded. Where this has occurred INEOS has assumed a level of emission the same as the lowest of the recorded metals. Additional representative data has been obtained by the Agency from our compliance check monitoring reports for all waste incinerators in England and Wales (which were not available to the Applicant for its Application). Based on the new data, and as described in the DD, we have assessed the impact of these metals is likely to be insignificant. In respect of CrVI we assessed the process contribution to be 0.6% of the EAL based on real values obtained from other MWIs. See DD section 5.2.4. In terms of the location of the CrVI mglc, It does not matter where it is located if it is shown to have insignificant impact on the environment. Anywhere else it will be lower and still insignificant. We are satisfied with the modelling process that we have used to assess the application.
Aircraft wake vortices	
HAGATI is concerned that overflying aircraft disturb the plume and push it back to the ground. They question the coincidence of the indicated flight paths and dispersion	The isopleth presented by HAGATI is not the same as that in the application. (Note: an isopleth is a representation on a map of a line, or contour, joining points of equal concentration; it is a typical representation on maps of modelling predictions.) This query has already been addressed in the DD; but to summarise the points: According to the data the 269^o flight path (the path most likely to

Brief summary of issues raised	Summary of action taken / how this has been covered
modelling isopleths. They consider there to be an issue with overflying what appears to be a zone of high mglc. The application states that on average flights over Runcorn occur about twice per hour. HAGATI state that because of peak scheduling there are periods of the day when the frequency is much greater. HAGATI state INEOS has been disingenuous about the number of affected runways and the provision of false information. HAGATI gives no further information.	impact the plume) is about 1 km north of stack. The suggestion from HAGATI that aircraft vortices will cause significant increases in ground level pollution is highly theoretical. We have considered that the likelihood of coincidence of an aircraft and the plume is low. If it were to occur, coincidence would have to be in three ways: space, height and time: • Spatial coincidence – when the aircraft flies along the flight path when there is a plume present. From the windroses presented in the application this is estimated to be for about one third of a year. In addition, the direction of the plume flow under these circumstances is away from the locations of peak predicted impact (which themselves are likely to be insignificant or not lead to exceedences of assessment criteria). • Height coincidence – when vortices from an aircraft come into contact with the plume. As a worst case, the maximum plume height (including its spread) would be at 300m and according to the dispersion model, this only occurs for a few hours per year. Under these weather conditions the predicted pollution on the ground is substantially lower than the maximum predicted for more adverse weather conditions when the plume is lower and away from the influence of the wake vortices. • Time coincidence – the duration that an aircraft passes through a plume. As described in the DD this is expected, given the speed of aircraft, to be for a few seconds per occasion only, and as there are only 50 flights per day this will only be for a few minutes a day. As the coincidence of an aircraft with a plume – if it actually takes place – is likely to be a rare occurrence, we do not consider this to be an effect that will give rise to significant pollution and therefore there is no need to require the Applicant to carry out more detailed modelling. In respect of the frequency of flights, the DD in Annex 4 (HAGATI Part 5) explains an average flight frequency of about 2 per hour. HAGATI believes this misrepresents peak times when the frequency is greater. Given the coincidence criteria described above we consider that even if all the daily flights passed over in a short time, the effects on the ground, if they occurred, would last for only a few minutes per day and would not give rise to significant pollution. Without further information we have no evidence to suggest there is anything wrong with the data presented by the Applicant.
Effects of the culvert in the Runcorn and Weston canal	
HAGATI is concerned that because of a culvert in the canal, downstream of the discharge point there may be backing up of water with consequences for chemicals build up.	There will be no consequences on the chemical concentrations in the outfall resulting from the position of the culvert. There are no persistent chemicals in the discharge; the treatment chemicals have been selected to be bio-degradable so they will disappear within hours of being discharged – see the Application for the chemical properties. By the time discharge water reaches the Weaver Navigation it will be indistinguishable from the rest of the water; there will be no treatment chemicals detectable in it. The temperature of discharge will be lower than stated by HAGATI. Permit condition 3.1.3 states that the maximum temperature shall be not more that 30^{o}C and not more than 24^{o}C for more than 4 hours per month. The change in temperature was reported in the response by

Brief summary of issues raised	Summary of action taken / how this has been covered
	INEOS. The flow rate in the canal, with the EfW discharge, is very low and the residence time before water reaches the culvert is several days, and it is another few days before it passes to the Weaver Navigation canal. There will be no water damming behind the culvert. The level in the canal is controlled by the lock gates at the downstream end of the canal, not by the flow through the culvert. There will be two discharges into the part of the canal upstream of the culvert: • The first is from the Salt Works which is consented to discharge at a rate of 4000 m^3 per day. This outfall is actually discharging at a rate of less than 100 m^3/day (and will continue to do so); • The second will be the INEOS EfW outfall which is expected to flow at about 60 m^3 per hour (1440 m^3/day). • In addition, the combined cross-section areas of the two incoming discharge pipes is less than the cross-section area of the culvert; this means that at full bore, the rate of flow of water in the two pipes can pass through the culvert. We are satisfied that the culvert can accept the combined flows into the canal with no discernible water level increase. The Runcorn and Weston Canal is not part of any eel migratory route (it is a dead end) and as the condition of the water from this canal as it enters the Weaver Navigation canal will be, at worst, unchanged from the present, eel migration in the Weaver Navigation will be unaffected.
Monitoring	
HAGATI is concerned about the lack of information regarding CrVI levels and monitoring.	Clearly no monitoring data can be obtained before the incinerator starts up (a programme of monitoring is required by IC5 of the permit). Monitoring and measuring CrVI in the stack gases is currently technically difficult. The DD section 5.2.4 describes how data from the ash of 10 other incinerators has been used to determine the proportion of CrVI to Total Cr assuming that the proportion in the ash is the same in the particulates passing through the stack. Total Cr can be measured at the stack and thus the CrVI can be back-calculated. The data from the 10 incinerators is therefore being used as an indicator of how this incinerator is expected to perform when similar types of waste are being incinerated. Given the technical measuring difficulties of CrVI we believe this is the best way of making a realistic assessment and is currently our approach, nationally.
In combination effects	
HAGATI states that not all of the incinerators or the Scottish Power PS near the INEOS plant have been considered by the Agency or Natural England. HAGATI is concerned that there are other	Section 5.6 of the DD states there are WID incinerators in operation and present on the INEOS Chlor Limited halochemicals site including INEOS Vinyls Ltd. There are also non-WID incinerators at the INEOS Chlor Limited EIP, the (former) INEOS Fluor Limited VTP and at Vinyls. The DD states that these have been in operation for several years and therefore their contributions are part of the background and need not be included separately. As has been described earlier (ref sec 5.3.2 and 5.3.2.1 of the DD) the impact of the EfW plant on the environment is insignificant. HAGATI's table 2 is incorrect by suggesting there are 12 incinerators close by. There are only those

Brief summary of issues raised	Summary of action taken / how this has been covered
NO_2 impacts that have not been taken into account – the effect of nitrates released from a source on Ince Marsh.	described above. HAGATI's table includes duplication as the result of variations to permits. Form 11, the Habitats assessment to Natural England is correct and needs no modification. The original question by HAGATI specified Weston Point PS, which has been shut down for several years. The Scottish Power PS (called the Weston Point CHP in the DD) was included in the in-combination assessment and described in the DD section 5.6. The PC for nitrogen oxides is a small proportion of the background pollution dominated by road traffic. Similarly, sources of nitrates secondary particles will also be dominated by road traffic and other sources, with only an insignificant contribution from this proposed plant. The HPA considered the health assessment and did not raise any concern regarding nitrates. Ince Marsh is more than 5km from INEOS and therefore even further from Runcorn. The DD section 5.6 explains that sources greater than about 2 km apart are not likely to have any combined impact.
Global warming potential (GWP)	
HAGATI states CO_2 emissions are lower from landfill than claimed in DD. HAGATI is concerned that the carbon emission data supplied may not be realistic	The DD describes CO_2 emissions from the activity as a combination of direct CO_2 as a combustion product and as CO_2 equivalent from other substances such as N_2O, which has a GWP rating of 310 (ie it has 310 times the effect of CO_2 as a greenhouse gas (GHG)). A landfill also emits CO_2, which may be in lower quantities than an incinerator. However it also emits methane in large quantities which has a GWP rating of 25. We assess GWP as a whole and not just in relation to CO_2. The assessment in the DD includes "on the credit side" CO_2 saved from the GHG emissions by displacement of waste disposal to landfill. The GHG referred to here includes methane. Carbon emissions are based on the carbon content of incoming waste. This information is fairly standard for RDF waste.
Abnormal operation, start-up and shut down and other unusual conditions	
HAGATI is concerned that not all the issues regarding abnormal operation have been considered. HAGATI presents technical data to show that dioxin emissions are higher in start up (S/U) and shut down (S/D) conditions and that continuous burning conditions are therefore better than batch burning. HAGATI is concerned that monitoring can be switched off during	All pollutants have been considered, see DD section 5.5. WID considers specific forms of abnormal operation that could affect the environment and these have all been considered. WID only considers total particulates and not different size fractions. The five-fold factor is a WID requirement. If it goes beyond this (as measured by particulates CEMs), waste must cease to be fed to the incinerator. Permit condition 2.3.10. The 60 hour annual abnormal operation limit is also a WID constraint, after which waste must cease to be fed. Permit condition 2.3.10. WID requires the continuous measurement of particulates, TOC and CO during abnormal operation because they are combustion condition parameters. It is considered more important (given that the condition can only last for 4 hours or else the waste must cease to be fed) to ensure the combustion is kept under control. Part of the commissioning will be to measure dioxins (etc) at all stages of the operation (including S/U and S/D). The Agency will closely assess the plan and report required by Pre-operational

Brief summary of issues raised	Summary of action taken / how this has been covered
soot blowing	condition PO03 and Improvement Condition IC4. The ability to continuously monitor dioxin has been addressed in the DD. The frequency of dioxin measurements has been specified by WID. We accept that S/U and S/D conditions may give rise to higher dioxin emissions. The WID limits take this into account and apply under those situations. It is for INEOS to ensure that the correct thermal conditions exist before waste is introduced to the furnace. Permit condition 2.3.6 requires this. The information provided by HAGATI looks fairly old and technology has improved. We also accept that continuous burning is better than batch; the INEOS incinerator is continuously operated and is not expected to have frequent S/U and S/D events. As described in the Application, total abatement cannot be bypassed. There is no event called "soot blowing" on this plant. Filter bags are cleaned continuously and automatically throughout the incinerator operation. All permit conditions apply during bag cleaning. Continuous emission monitoring cannot be switched off and in the event of a CEM failure during bag cleaning, there are installed standby devices to take over the monitoring.
Health impacts	
HAGATI is concerned that the FSA comments have not been taken into account. HAGATI is concerned that the IRAP-H model has not been used correctly and also state that the PM are likely to be much smaller than PM_{10} as described. HAGATI have commented that only the dioxin TDI values for adults and children have been taken into account; the TDI for infants will be much lower and should be used. They claim that a background level that is 45% of the TDI (ie 0.9 pg/kg-bw/day) is dangerous for infants. HAGATI is also concerned that dioxin intake data given by INEOS is incorrect	We have considered all of the FSA's comments to us and this is summarised in section 5.3.2.1 of the main body of this document. The extract from the FSA statement "....it is not possible to say with any confidence that the proposed operation will not have an adverse effect on the safety of the food chain" has been taken out of context by HAGATI and was superseded by subsequent comments from the FSA. We have confirmed that the deposition rates used in our check modelling are conservative and still result in predictions that are, according to the FSA "not of concern". We state that RPS (INEOS's contractor) used unrealistically high deposition rates and then used rates 10 times lower. The value of 10% of the rate used by RPS comes from the H1 screening values which are themselves also highly conservative. Our statement therefore is still highly conservative and therefore protective. The HMIP 1996 model uses more realistic (but still conservative) values approximately 100 times smaller than the RPS model. We agree that emissions are most likely to be $PM_{2.5}$ or less. Under these circumstances deposition rates will be lower still because smaller particles are lighter and lighter particles will fall more slowly resulting in improved dispersion. FSA's final comments infer there are no anticipated issues with dioxins and metals because the FSA has relied on Agency expertise for the information provided and it is the Agency's consideration that there are no anticipated issues. For assessment check purposes the Agency does not use the USEPA reference dose values. In the UK, we are advised by DEFRA, the HPA and COT to use the COT-TDI as a lifetime dose. The COT has defined the TDI for all humans as 2 pg/kg-bw/day over a lifetime exposure. As such the infant exposure will be likely to be greater than an adult due to their body weight and any dietary differences (e.g. breastfeeding). The TDI as a lifetime exposure takes this into account

Brief summary of issues raised	Summary of action taken / how this has been covered
HAGATI states that Frodsham Marsh has a dioxin level of 109 ng/kg whereas the national averages are given as 28.4 ng/kg; the Agency should take into account the very high background level. They also claim that a farmer could not drink milk from cows grazing on, or eat rabbits from, Frodsham Marsh because of the high dioxin content. HAGATI claims PCT stated at a meeting on 24/02/11, that Halton is classed as a vulnerable population. HAGATI believe the HPA/PCT have omitted to consider the effects of stress and house prices in their responses. HAGATI has indicated that particle size and not particle mass is the important parameter concerning health HAGATI claims their data has been ignored by ourselves and other consultees and that the Lancaster University study has been ignored. HAGATI comments on the conditions at Runcorn Hill LNR and the harm to health. HAGATI is concerned that their submitted reports on Hg poisoning have not been taken into account	and is considered protective in any case. The HPA make specific statements on infant intake "that, although intakes of dioxins and dioxin-like PCBs by breast-fed babies are higher than is desirable, encouragement of breast-feeding should continue on the basis of convincing evidence of the benefits of human milk to the overall health and development of the infant". When deriving the TDI, the COT has considered averaging times, in-utero and infant breastfeeding effects. The COT refers to studies on foetal impact in: http://www.food.gov.uk/multimedia/pdfs/cot-diox-epi.pdf and provides a lay summary of how the TDI was set in: http://www.food.gov.uk/multimedia/pdfs/cot-diox-full.pdf Frodsham Score is not the location of the highest ground level concentration of pollutants from the incinerator. The DD (at section 5.3.2.1, FSA(4)) states that at Frodsham Score the peak annual dioxin addition would be no more than 20% of the highest. The highest contribution has already been demonstrated to be insignificant, so at 20%, the contribution at Frodsham Score is even lower. The FSA has presented no information to suggest that the local background concentrations of dioxin etc in soil are at levels to cause concern. We have assessed that as a worst case, as a very conservative prediction, if local residents were to drink only the milk produced from cattle grazing on Frodsham Score the PC of dioxins from the INEOS incinerator would be less than 0.008% of the TDI. This is less than 0.0002 ng/kg-bw/day compared with the TDI of 2 ng/kg-bw/day and is considered to be insignificant. *Insignificance*: Where an impact, or contribution, is less than 1% of a threshold (such as a TDI or EAL) we usually consider this to be insignificant. We have considered HAGATI's comments but where the additional contribution from the Installation is modelled as very low, and • at levels where the PC is within the normal range of errors, so at the point of deposition it is not likely to be discernible; and • that the modelling in itself is based on conservative assumptions and likely to be an over-estimate; and • that neither PCT/HPA nor the FSA have raised concerns about this area being used for food production; and • that all this is against a background of falling ambient levels (human dietary intake of dioxins have dropped from 1.8 pg/kg-bw/day in 1997 to 0.9 pg/kg-bw/day in 2001; it is reasonable to expect that because controls on these emissions are getting better, the levels are likely to fall further.) we are satisfied that any impact is insignificant, even if the background levels may be high. In respect of the 24/02/11 meeting, Halton was not indicated as being a vulnerable or at-risk population. In respect of stress, house prices, mercury poisoning and particulate size, the PCT was consulted on health issues and how the HPA (on behalf of the PCT) respond is a matter for them. Based on the response we decided that there was no likely risk to health from the incinerator. We are satisfied we have considered all the health issues relevant to our determination. WID limits for particulate emissions are

Brief summary of issues raised	Summary of action taken / how this has been covered
HAGATI is concerned that we have not paid enough attention to the Precautionary Principle. HAGATI suggests that the Environment Agency is acting as agent for INEOS in respect of the assessments the Agency has carried out.	mass related, not size related. In respect of information supplied by HAGATI, we have considered everything they have submitted. Our duty is to take such steps we consider appropriate for consultation; this we did. All submissions were publicly available via the public registers. With regards to distributing HAGATI responses to other parties, we sent those responses regarding the HHRA to the HPA in April 2010 and they made no comment regarding those documents. We did not send HAGATI's responses to the FSA. We do not consider their assessment was compromised as a consequence. The conclusions of the Lancaster University study do not indicate we should change our view. The impact of NOx on residents on Runcorn Hill is below the EAL for humans (40 µg/m^3); see tables 5.2.1 and 5.2.2 in the DD and is not considered to be harmful. In respect of the purpose of the Precautionary Principle see annex 4(C) of the DD. It is only relevant where there is good reason to believe harmful affects will occur and we cannot assess the likelihood or consequences. In this situation we have assessed the likelihood and consequences and we do not consider that there will be any harmful effects. It is not correct to suggest we are acting as agents for INEOS. It was stated in the DD sections 5.3.2.1 and 5.4 that we examined data to ascertain whether there was a problem. If there was, the Agency would have referred the issue back to INEOS for them to resolve. As it was, there was no problem and therefore no need to refer back to INEOS.
Noise	
HAGATI claims there are noise sensitive receptors that have not been included in the assessment. HAGATI believes noise limits in the planning consent are inadequate and want tight limits in the permit in respect of nuisance. HAGATI is concerned that residents on Clarks Terrace are being denied their rights under the Human Rights Act 1998 with respect to noise pollution. HAGATI have other specific concerns on	We are satisfied that the receptors included in our noise assessment are representative of the worst case and that the assessment is robust. We consider that at all other receptors, any increase in noise level will be less significant. We agree that it is not reasonable for residents to have to close windows to prevent noise disturbance. Two conditions in the permit give protection against noise and vibration from the installation: 3.4.1 and 3.4.2 (definition of "pollution" is given in EPR 2010) which include the facility for Agency to require a noise management plan. There is also the general management condition 1.1.1 requiring the operator to respond to complaints. We are satisfied that BAT for noise control is being used. The references by HAGATI to the 1dB and 3dB levels above background at certain times of the day for residents at Clarks Terrace have been explained in the DD. Pre-operational condition PO06 requires a noise survey during and after commissioning. No further off-site conditions are considered necessary. HAGATI's reference to noise limits is not correct – values are WHO **guidelines**, which in industrial areas in UK are frequently exceeded as background noise. The background data in this part of Runcorn already appears to exceed the WHO guidelines. Despite this, we are satisfied that assessment using BS4142, does not indicate "that complaints are likely".

Brief summary of issues raised	Summary of action taken / how this has been covered
noise: Halton BC response; the cooling towers; the impact of the Noise Policy Statement for England (NPSE); train movements; that a new housing development ("Evolution") has not been taken into account.	In terms of the Planning Consent, noise was assessed as part of the planning application process and conditions were imposed to prevent problems arising. We also considered noise and reached the view that the activity would not give rise to problems. The issue of nuisance should not arise although we have a condition under which we can require revisions to noise management if we consider it necessary. The Human Rights Act (HRA) would only be engaged if noise was a nuisance and we are satisfied it will not be. The permit conditions described above protect against noise pollution. The HRA is already covered in the DD. Additional noise levels from the cooling towers are not expected to worsen the situation. The permit conditions described above, apply. The NPSE is guidance, not a requirement. We are satisfied that BAT is to be used on the plant for noise abatement. Noise arising from the transport associated with reception of waste within the installation boundary has been considered in the application. Noise from outside the installation was considered as part of the planning determination. Planning conditions still apply after the permit is issued and constraints on rail movements in respect of this facility are subject to planning conditions. Evolution is 850m from the stack, 1100m from the cooling towers and 600m from the closest boundary of the rail siding. The noise assessment shows that the greatest noise source is from the train unloading shuttle on the main site, about 900m from Evolution. There are closer residences to the site. We consider that there are better representative receptors than Evolution.
Natural England, Habitats and Non-statutory conservation site considerations	
HAGATI have indicated a number of issues at Runcorn Hill: o EQS exceeded; o Runcorn Hill should be a protected site; o The conditions at Runcorn Hill LNR; HAGATI say that the NOx at Runcorn Hill should be used as benchmark instead of that at the Town Hall. HAGATI enquire why an HF assessment has been carried out at the Ramsar site when there are numerous other emissions that could affect birds	Protection criteria for non-stat conservation sites, such as Local Nature Reserves, are not the same as for Habitats or SSSI in that we are required to ensure there is no significant pollution (described in section 5.4 of the DD). The evidence for NOx ambient level indicates that we cannot rule out the background being already above the ecological air quality critical load of 30 µg/m^3. The predicted PC is 0.82 µg/m^3 which is 2.7% of the CL. This is considered to be insignificant for non-statutory conservation sites, being less than 100% of the critical level [as agreed with Natural England]. We therefore consider that further assessment is not required Runcorn Hill is a Local Nature Reserve, not a SSSI. Having considered the condition of the site, after discussions with the local authority, we are satisfied that the potential additional impact of the INEOS incinerator, including present background levels of acid and nitrogen deposition will not cause damage to the site (see sec.5.4 of the DD). HAGATI is wrong to say the NOx at Runcorn Hill is higher than the EAL. The EAL (a human protection parameter) is 40 µg/m^3 and the predicted environmental concentration resulting from the EfW operation is 35.4 µg/m^3. NOx data from Runcorn Town Hall is considered appropriate for benchmarking.

Brief summary of issues raised	Summary of action taken / how this has been covered
	The HF impact assessment was requested by Natural England as part of their consultation response because the HF levels that affect vegetation are much lower than the levels that affect humans or other wild life (birds, mammals etc). HF impact data has been presented for the Ramsar, SAC, SPA and SSSI sites. See schedule 5 #5 response. Although data has not been presented for the LNR we are satisfied that, as with the statutory sites, the impact will be insignificant.
Assessment of pollution in Estuarine silt	
HAGATI highlight an error in units in a table. HAGATI state there is an error in Hg background level of factor of 3,000,000. HAGATI claims that the source of Hg data has not been given. HAGATI state Natural England have made contradictory statements regarding critical loads of metals, dioxins and PCBs in silt. They then quote data from Canada to prove this statement. HAGATI claim another fatal flaw – we did not use dioxin, PAH and Hg background data supplied by them; neither did we use studies available in the public domain "revealed in any literature search". HAGATI is concerned that the incremental Hg increase not been taken into account on Mersey Estuary silt contamination.	HAGATI is correct about the error in the table in section 5.4 of the DD. The error has been rectified in this version of the DD. The error consisted of two aspects: o The first aspect was the omission of some units (which should be mg/kg), which gave rise to the ambiguous usage of other units. The original conclusions drawn from the table are unchanged because all comparators are ratios so columns three, five and seven are unchanged; the impact is very small compared to the background (<1% in all cases) even conservatively taking the lower background readings. o The second aspect was the incorrect recording of the dioxin level in silt which was reported to Agency as 8.7 µg/kg (and stated as 8700 ng/kg in the DD) instead of the correct value of 8.7 ng/kg. The correction of this error has the effect of changing the dioxin ratio of PC/background from <0.0005% to <0.3%, a level still considered to be insignificant. In respect of the apparent underestimation of the mercury levels in silt, the range of data describing Hg in silt is given as 0.7 to 2.03 mg/kg. However we have only used the lower value (0.7) to enhance the sensitivity of the result (see section 5.4 of the DD). This gives PC/background ratio result which is a factor of 3 higher than if the higher silt value (2.03) is used. When the values are further corrected for the units ambiguity described above, (from mg/kg to ng/kg; a factor of 1,000,000), it can be seen there is no factor error of 3,000,000. Mercury data sources were given: the table in section 5.4 of the DD references "background map close to Runcorn" which was submitted as part of Natural England's response to the Application. There was no contradiction in the Natural England statements: because there are no Critical Loads in UK for pollution in silt, the next best thing for comparison purposes is the Canadian data. We consider that the PC for each pollutant is considered insignificant against the Canadian guidelines and the background levels. In terms of the use of data, we used that supplied by Natural England (on 8/11/10) for our silt assessment. HAGATI supplied references to scientific papers on the effects of pollutants in silt. Natural England is the relevant body for consulting on these matters and would be expected to provide the most appropriate data based on available scientific information. Our assessment in section 5.4 of the DD of the impact of dioxins, mercury etc from this waste incinerator on the Mersey estuary is that it would be insignificant.

Brief summary of issues raised	Summary of action taken / how this has been covered
	In respect of the possible incremental impact of Hg levels in the silt, the current level of Hg contamination in silt is the result of many years of legacy industry that no longer discharges Hg in the quantities that it did before present regulatory controls. There have been several orders of magnitude reduction in Hg discharges. It is therefore reasonable to expect that the Hg level in the silt will decrease with time. We therefore consider that because the PC of Hg resulting from the INEOS plant is insignificant, any incremental impact of Hg in the silt from the plant would also be insignificant. The values shown in the DD (section 5.4) indicate this is a reasonable assumption.
Heronries	
HAGATI believes that consideration of the air pathway route of dioxins to the heronries is ludicrous. HAGATI is concerned about why the heronries are affected by dioxin contamination and whether a DEFRA study could be carried out into the cause.	As part of the determination it is important to determine the source, pathway and receptor involved in an environmental impact. For the heronries, the source (as far as this assessment is concerned) is the EfW plant, the receptors are the herons eggs and there could be 2 pathways – directly by air and indirectly by the food eaten by herons. The aerial route was considered and discounted because of the distances involved. The DD considers the food aspect. The reasons why the heronries may be currently affected by dioxins are not for this determination. HAGATI should approach DEFRA directly if they feel there is an issue.
Availability of early draft documents	
HAGATI is concerned that a copy of the draft permit and DD were made available to INEOS but not the public. HAGATI state that a letter from the Agency saying "important that everyone gets the same information at the same time" has not been followed by the Agency. HAGATI state that the effect of INEOS having prior sight of the drafts was that they could sign contracts with other companies and also commence plant construction.	This was done in mid 2010 to ensure that the facts in the partially completed draft DD and permit prepared by the Agency were correctly represented. The draft DD and permit were works in progress and making the documents available to the public at that time would not have served the public or the Agency as any correspondence entered into would have been based on incomplete documents and would not have been helpful to anyone. The final draft was not issued for another 6 months and the reasons for the delay were to do with finalising the documentation. The version provided to the Applicant was incomplete as they only looked at certain sections, that had been completed, for factual accuracy. Commercial decisions by INEOS are not a matter for the determination process. Any decisions INEOS takes regarding the plant construction before a permit is issued are totally at their risk.
Public representations	
HAGATI implies that	In considering the determination process as a whole we consider the

Brief summary of issues raised	Summary of action taken / how this has been covered
loose wording in the various notices has caused confusion. HAGATI reproduced a series of emails which describe the feelings of those residents who attended the drop in events.	nature of the proposed operations has been made clear. All the emails involving the Environment Agency have been addressed in the DD. One email not previously sent to the Agency concerned the structure of the drop-in event in February 2011 and the dissatisfaction/disgust felt by this person about the usefulness of the event. We are disappointed that this was the case for this person as it was not reflected in the overall feedback from other attendees at the event. We are satisfied that we have had a full and effective consultation process as indicated by the number of responses received. Although there was no new information concerning the determination, the comments will be borne in mind by the Agency for future drop-in events.
Issues not relevant to this determination	
Planning aspects	Road to rail traffic ratio changes (condition 57 of the planning consent) is a planning issue. Transportation of waste is a planning matter, described in the DD. The Halton Unitary Plan contains issues concerning surrounding development and is not relevant to this determination.
Comment about the "original" application referring to waste arrivals by water.	This did not form part of the Permit application.

c) Representations from Individual Members of the Public

A total of 38 responses were received from individual members of the public. These raised many of the same issues as previously addressed and are summarised in the following table. No new issues were raised.

Brief summary of issues raised	Summary of action taken / how this has been covered
"Condition 57"; the amount of waste going to landfill; road traffic volumes (including the impact on the Mersey Gateway Bridge Project); visual impact (with photographic evidence); property values	These are Planning Permission matters and, as has been discussed elsewhere, were not and cannot be considered as part of this determination.
A belief that the modelling studies assumed a flat terrain and that the effects of the prevailing winds on the escarpment were not known.	Terrain, which includes the escarpment rising to Runcorn Hill and beyond, was included in the assessment. See section 5.2 of this document.
A few complaints were received about noise issues on the construction site that were currently being experienced.	Construction on site is not part of the determination process under EPR. These complaints were referred back to the Applicant and to Halton Borough Council for follow up.
Several comments were received regarding the lack of advertising of the drop-in session and the consultation exercise.	A response was made to each of the persons making this comment, explaining where and when the advertising took place (see part B above) and supplying the appropriate link to the Agency website. We are satisfied the advertising was appropriate and effective.
Further comments were made about the	These matters have been described in detail throughout

Brief summary of issues raised	Summary of action taken / how this has been covered
impact on pollution and public health.	this document.
Comments made about the odour emissions	Odour was considered in section 6.5.4 of this document.
Comment made about a perceived problem with a report by the local PCT affecting the response of the PCT.	The HPA has assessed the health implications of the incinerator and this has been described in this document, in detail in Part (A)1 of Annex 4 of this document. The content of their responses is a matter for the consultees. We considered those comments as part of our assessment of health issues as described in the main body of this document.
There was a concern that this incinerator had not been considered in conjunction with other projects in the vicinity.	Many of the projects would not be relevant for our purposes. The projects we consider relevant have been described in section 5.6 of this document.
A few letters had the following points: 1. HAGATI questions not answered 2. Early draft to INEOS 3. Change of classification 4. Greater Manchester implications 5. Stack height 6. Missing properties from noise assessment 7. Traffic noise and pollution 8. Vulnerable population 9. Impact on Halton's "sites of special interests" 10. FSA concerns not addressed 11. Noisy steam releases. 12. Agency monitoring and response to incidents; accessibility to telephone numbers 13. Randle Island as the disposal route 14. Public consultations inadequate 15. Cooling tower plume visibility 16. Aircraft over flights affecting plumes 17. Health effects, noise, stress 18. Property valuation affected by location. 19. Independent survey required	1. We consider the HAGATI response is addressed in appropriate detail, above 2. The early draft was to check for factual accuracy; there was no advantage given to INEOS. The responses from INEOS demonstrate this was their understanding. 3. Early discussions about the section reference under EPR suggested section 1.1. This was changed before the Application was made to section 5.1. This is explained in section 4.1.1 of this document. 4. This is discussed in the consideration of the HAGATI response, above and is outside the scope of this determination. 5. Stack height is described in this document. We are satisfied the stack height is appropriate. 6. We believe that a representative selection of areas has been used in the assessment. Russell Road north which has been identified in the Application, would be representative of Westfield Road. 7. Transport issues outside the site boundary are considered in the Planning Consent. Transport issues (including reversing alarms) inside the boundary are subject to the permit. 8. According to the PCT this is not a vulnerable population. "Incorrect figures" in the permit have not been identified by the respondent. 9. We assume the correspondent means "site of special **scientific** interest (SSSI)". The impact on the SSSI is summarised in section 5.4 of this document. Consideration of heavy metals, dioxins and PCBs were included in the impact assessment carried out in terms of the Countryside Rights of Way Act (CROW). We concluded there was no likely effect of the EfW on the SSSI. 10. We believe the concerns of FSA have been fully addressed in this document, section 5.3.2.1 11. There will be no steam releases from this plant unless under safety/emergency conditions. 12. Monitoring of the operation will be carried out in accordance with the Agency compliance procedures. There is an Agency emergency contact (08708 506 506) available for 24 hours reporting, and all-hour call-out arrangements in the event of major incidents. In

Brief summary of issues raised	Summary of action taken / how this has been covered
	addition the Operator can be contacted directly to invoke immediate response to an event. 13. Randle Island landfill is not subject to this determination. There is a separate permit for that site with which compliance is required. INEOS will need to demonstrate that waste generated by the Installation will be recovered where possible and if not disposed of and in either case with the minimum environmental impact . 14. HPA attended two drop-in events, November 2009 and February 2011 to answer questions on health issues. Attendees were requested to sign an attendance sheet. Attendees were also requested to write to the Agency at PSC, Sheffield with any comments on issues that were not satisfactorily addressed at the events. 15. The stacks will be largely free of visible plumes that extend beyond the site boundary. This relates to visible plumes which consist of condensing steam. The Application states that from the main stack a plume would be visible for, at worst, 7.9% of the year but for only 21 hours per year (0.1% of annual hours) would the plume extend beyond the site boundary. The Application also states that from the cooling towers a plume would be visible for, at worst, 29.6% of the year but only for 120 hours (1.5% of annual hours) extend beyond the site boundary. At no time will visible plume strike the ground. There is no expectation of plume shadowing at any residential properties. The indicated hours represent day and night hours. It is reasonable to expect that more of the plumes would occur during the night when the air is cooler. The Agency considers this to be a reasonable assessment. Agency guidance indicates that if the incidence of plumes extending beyond the site boundary during daylight hours is less than 5% per year the impact can be considered low. 16. References to plume in the context of aircraft over-flights are to the other components of the main stack releases (NO_x, SO_2, particulates etc) and are not visible. The plume from cooling towers is only water vapour and disappears (becomes invisible) very quickly after it passes out of the towers. Our assessment of the impact of flights over the Runcorn area on the incinerator plume is described further in the consideration of the HAGATI response, above. 17. Health effects from emissions have been assessed by HPA and the Agency as described in this document. 18. Property values are not relevant to the Permit Application. 19. The determination has been carried out in accordance with the procedures of the Environment Agency in consultation with FSA. PCT, Natural England etc. The Agency has a statutory duty to determine the Application; an independent survey is not considered

Brief summary of issues raised	Summary of action taken / how this has been covered
	necessary or appropriate.
Another letter had additional points (some were duplications of the points above): 20. As 3 above 21. As 10 above 22. Vehicle movements based on bulk density of incoming waste: There was a concern that because of the low bulk density of the incoming treated waste there would be more truck movements than declared in the Application. 23. Greenhouse gas emission calculations: There is an observation that suggests that the GHG calculations should be based on gas burning emission equivalence, instead of coal burning equivalence and that GHG emission from landfill disposed waste is lower than stated in the Application. Should also be subject to EUETS. 24. Status of "insignificance": needs reference to background levels to be meaningful 25. As 2 above	22. It is confirmed that a 20 tonne truck can accept 18.5 tonnes of RDF. When material is loaded into a container it is compacted thereby confirming the calculation basis. The same type of container, especially designed for this duty, can be put onto rail trucks and road vehicles. 23. We agree that, depending on fuel qualities, gas burning will produce about 60% less CO_2 than coal burning. However, the comparison to offset carbon emissions from incineration against those from coal powered power station is the most appropriate to make. It is reasonable to expect that electricity generated from incinerators should replace electricity generated from the most inefficient power station – the coal fired power station, whose output would be cut back appropriately. In respect of GHG emissions from landfill, it is generally accepted that in the short term, CO_2 from incineration will be higher than GHG from landfill because CO_2 creation from an incinerator is instantaneous whereas it takes longer to convert the waste in a landfill. However there are greater long term benefits with incineration because the production of methane is eliminated. Although transient in the atmosphere methane has 21 times the GWP of CO_2. We do not consider there to be any reason to change our conclusions. The EUETS only relates to combustion plants burning natural fuels such as gas, oil or coal. Waste fuels are not included in the scheme. 24. It is the Agency's position that where an impact is assessed as "insignificant" it usually means that the impact is less than 1% of the safe level of the parameter in question. It also means that even if an insignificant amount is added to a background level that is not insignificant, the change is insignificant and the **added** impact is usually insignificant (*see the discussion on "insignificance" in the consideration of the HAGATI response in section (c) immediately above this section).*

d) Representations Made at The Drop-In Event

The drop-in event on 24 February 2011 took place in two phases. The morning phase included invited councillors, an MP and members of HAGATI. As this group had made a significant contribution to the determination process we considered that a direct meeting would be of benefit to the process. The discussions mainly involved clarification of issues in this document. A correction was subsequently made to the silt impact table in section 5.4 of this document when it was pointed out that there appeared to be some inconsistencies in the units of measurement. There are no changes to the conclusion that the incinerator will have insignificant impact on the estuary sediment and therefore we consider there is no requirement to reconsult on this decision. Participants were advised that if there were any relevant issues about the determination that had not been resolved in the meeting and not

considered in the draft decision document they should write to the designated Agency address expressing those concerns.

The afternoon phase was open publicly and was attended by about 40 persons, who were a mixture of local residents and business community potentially impacted by the proposed facility. The issues discussed were generally the same as those considered in the table above. One of the comments received related to the background levels of dioxins and mercury in the sediment of the Mersey Estuary. (As for the morning session, this related to the silt impact table in section 5.4 of this document.) The source of the data was subsequently checked and corrections made and presented in this document. The correction made no change to the conclusions of the assessment and therefore we consider there is no requirement to reconsult on this decision. The attendees were advised that if they had any relevant issues about the determination that had not been resolved in the drop-in event discussions and not considered in the draft decision document they should write to the designated Agency address expressing those concerns. The comments subsequently received are included in summary in the table above.

C) Matters which are outside the Agency's Permitting Remit

Precautionary Principle: The United Kingdom Interdepartmental Liaison Group on Risk Assessment (UK-ILGRA) state in their paper "The Precautionary Principle: Policy and Application" that the precautionary principle should be invoked when there is good reason to believe that harmful effects may occur and the level of scientific uncertainty about the consequences or likelihood of the risk is such that the best available scientific advice cannot assess the risk with sufficient confidence to inform decision making. The Health Protection Agency, (Response to British Society for Ecological Medicine Report, "The Health Effects of Waste Incinerators) say that "as there is a body of scientific evidence strongly indicating that contemporary waste management practices, including incineration, have at most a minor effect on human health and the environment, there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new incinerators"

Location of the Installation: Decisions over land use are matters for the planning system. The location of the Installation is a relevant consideration for Environmental Permitting, but only in so far as its potential to have an adverse environmental impact on communities or sensitive environmental receptors. The environmental impact is assessed as part of the determination process and has been reported upon in the main body of this document.

Vehicle access to the Installation and traffic movements: These are relevant considerations for the grant of planning permission, but do not form part of the Environmental Permit decision making process.

The Use of Alternate Technologies: It is argued that Incineration is not an environmentally sustainable technology and therefore almost by definition cannot be considered to be the Best Available Technique (BAT). The

Environment Agency is aware that a number of proposals are coming forward for other ways of dealing with waste streams such as pyrolysis and mechanical / biological treatment. At this time however, incineration at this scale using moving grate technology can still be considered BAT, subject to the appropriate assessments being made. Anaerobic digestion is most suitable for high moisture content biodegradable wastes such as food and agricultural wastes, and can be applied where there is separate collection of these waste streams. Some technologies such as plasma arc gasification are currently considered not to meet the definition of 'availability' due to their very limited application worldwide.

It is important to draw a distinction between Sustainability Appraisal and Best Practicable Environmental Option (BPEO) and BAT. In Planning Policy Statement 10 (PPS10) (Planning for Sustainable Waste Management) Sustainability Appraisal forms part of the decision making process which should be applied so as to shape planning strategies that support the Government's planning objectives for waste management. Thus Sustainability Appraisal is an important part of plan formation and planning decisions are made by reference to planning policies. BPEO forms a similar function in Wales. BAT assessment is a technical appraisal that the proposed technique is the best available for the protection of the environment as a whole.

Incinerator Capacity and its effect on Waste Recovery and Recycling Activities: It is argued that as the quantity of residual waste reduces over the lifetime of the Installation, the need to maximise efficiency by maintaining the incinerator at full capacity will suppress waste recovery and recycling initiatives, which are higher up the waste hierarchy. This is part of a waste management strategy which is a matter for the local authority. the Environment Agency's role is to ensure that it can be operated without giving rise to significant pollution or harm to human health. In any event Permit conditions will prohibit the burning of any separately collected or recovered waste streams.

Import of Waste: It is argued that diminishing supplies of residual waste from the surrounding area over the lifetime of the Installation will result in the importation of waste from outside the area or sub-region. This is similar to the point above on the potential impact on local recycling.