Appendix 4.4

Compliance with Best Available Techniques (BAT)

1. Introduction

This report consists of a review of the proposed activities on site in the context of any applicable Best Available Techniques (BAT).

The Industrial Emissions Directive 2010/75/EU (IED) and the European Union (Industrial Emissions) Regulations 2013 (SI 138 of 2013) define BAT, BAT Reference Document (BREF) and BAT Conclusions (BATC) as follows:

The Industrial Emissions Directive defines Best Available Techniques as follows: 'best available techniques' means the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole: a) 'techniques' includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned. b) 'Available techniques' means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator; **c)** 'best' means most effective in achieving a high general level of protection of the environment as a whole;
The Industrial Emissions Directive definition of BAT Reference Document is as follows: "(11) 'BAT reference document' means a document, resulting from the exchange of information organised pursuant to Article 13, drawn up for defined activities and describing, in particular, applied techniques, present emissions and consumption levels, techniques considered for the determination of best available techniques as well as BAT conclusions and any emerging techniques, giving special consideration to the criteria listed in Annex III;" SI 138 of 2013 has a similar definition.
The Industrial Emissions Directive and SI 138 of 2013 have the same definition of BAT conclusions, as follows: 'BAT conclusions' means a document containing the parts of a BAT reference document laying down the conclusions on best available techniques, their description, information to assess their applicability, the emission levels associated with the best available techniques, associated monitoring, associated consumption levels and, where appropriate, relevant site remediation measures;

The Industrial Emissions Directive 2010/75/EU replaced seven existing directives including the Integrated Pollution Prevention and Control (IPPC) Directive (2008/1/EC).

- Historically, the BREF process for the IPPC Directive produced guidance documents that member states had to have regard to when permitting (licensing) installations
- However, the IED has made BAT conclusions mandatory in the permitting process (Article 14(3) of the IED)

Where BAT conclusions are available for any new installations, they are expected to achieve the associated standard before commencement of operations.

For existing installations, the IED provides that where a Commission Implementing Decision on BAT conclusions is published, within four years (relating to the main activity of the installation), the Environmental Protection Agency (EPA) should undertake that 'all permit/licence conditions for the installation concerned are reconsidered, where necessary updated' and 'ensure compliance with the BAT'.

The European IPPC Bureau (EIPPCB) organises and co-ordinates the exchange of information between Member States and the industries concerned on Best Available Techniques (BAT), as set forth in Article 13 of the IED. The EIPPCB produces BAT reference documents (BREF) and BAT conclusions.

2. Activity

It is intended that the facility will be licensed to carry out the following activities as outlined in the First Schedule of the Environmental Protection Agency (EPA) Act 1992, as amended:

11.3: Disposal or recovery of waste in waste incineration plants or in waste co-incineration plants –

a. *for non-hazardous waste with a capacity exceeding 3 tonnes per hour,*

b. *for hazardous wate with a capacity exceeding 10 tonnes per day.*

3. BAT/BREF Assessments

A review of the European Commission Integrated Pollution Prevention and Control *Reference Document on Best Available Techniques on Waste Incineration 2019* is presented in the table below.

Conclusions on BAT		Applicability Assessment
5.1.1. Environmental Management Systems		
BAT 1	In order to improve the overall environmental performance, BAT is to elaborate and implement an environmental management system (EMS) that incorporates all of the following features: i. commitment, leadership and accountability of the management, including senior management, for the implementation of an effective EMS; ii. an analysis that includes the determination of the organisation's context, the identification of the needs and expectations of interested parties, the identification of characteristics of the installation that are associated with possible risks for the environment (or human health) as well as of the applicable legal requirements relating to the environment; iii. development of an environmental policy that includes the continuous improvement of the environmental performance of the installation; iv. establishing objectives and performance indicators in relation to significant environmental aspects, including safeguarding compliance with applicable legal requirements; v. planning and implementing the necessary procedures and actions (including corrective and preventive actions where needed), to achieve the environmental objectives and avoid environmental risks; vi. determination of structures, roles and responsibilities in relation to environmental aspects and objectives and provision of the financial and human resources needed; vii. ensuring the necessary competence and awareness of staff whose work may affect the environmental performance of the installation (e.g., by providing information and training); viii. internal and external communication; ix. fostering employee involvement in good environmental management practices; x. establishing and maintaining a management manual and written procedures to control activities with significant environmental impact as well as relevant records; xi. effective operational planning and process control; xii. implementation of appropriate maintenance programmes; xiii. emergency preparedness and response protocols, including the prevention and/or mitigation of the adverse (environmental) impacts of emergency situations; xiv. when (re)designing a (new) installation or a part thereof, consideration of its environmental impacts throughout its life, which includes construction, maintenance, operation and decommissioning; xv. implementation of a monitoring and measurement programme; if necessary, information can be found in the Reference Report on Monitoring of Emissions to Air and Water from IED Installations; xvi. application of sectoral benchmarking on a regular basis;	Applicable Indaver's facilities in Ireland and elsewhere operate environmental management systems certified to ISO 14001.

Conclusions on BAT		Applicability Assessment
	xvii. periodic independent (as far as practicable) internal auditing and periodic independent external auditing in order to assess the environmental performance and to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; xviii. evaluation of causes of nonconformities, implementation of corrective actions in response to nonconformities, review of the effectiveness of corrective actions, and determination of whether similar nonconformities exist or could potentially occur; xix. periodic review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness; xx. following and taking into account the development of cleaner techniques. xxi. Specifically for incineration plants and, where relevant, bottom ash treatment plants, BAT is also to incorporate the following features in the EMS: xxii. for incineration plants, waste stream management (see BAT 9); xxiii. for bottom ash treatment plants, output quality management (see BAT 10); xxiv. a residues management plan including measures aiming to: a. minimise the generation of residues; b. optimise the reuse, regeneration, recycling of, and/or energy recovery from the residues; c. ensure the proper disposal of residues; xxv. for incineration plants, an OTNOC management plan (see BAT 18); xxvi. for incineration plants, an accident management plan (see Section 5.2.4); xxvii. for bottom ash treatment plants, diffuse dust emissions management (see BAT 23); xxviii. an odour management plan where an odour nuisance at sensitive receptors is expected and/or has been substantiated (see Section 5.2.4); xxix. a noise management plan (see also BAT 37) where a noise nuisance at sensitive receptors is expected and/or has been substantiated (see Section 5.2.4).	
5.1.2. Monitoring		
BAT 2	BAT is to determine either the gross electrical efficiency, the gross energy efficiency, or the boiler efficiency of the incineration plant as a whole or of all the relevant parts of the incineration plant.	Applicable The gross electrical efficiency will, as a minimum, meet the requirements set out in the Waste Framework Directive in order to ensure that the plant is classified as an R1 or Recovery facility.
BAT 3	BAT is to monitor key process parameters relevant for emissions to air and water including those given below.	Applicable Flue gas and combustion chamber parameters will be continuously analysed. There is no wastewater generated from FGC and there is no bottom ash treatment plant on site.

<table>
<tr><th>Conclusions on BAT</th><th>Applicability Assessment</th></tr>
<tr><td></td><td>
<table>
<tr><th>Stream/Location</th><th>Parameter(s)</th><th>Monitoring</th></tr>
<tr><td>Flue-gas from the incineration of waste</td><td>Flow, oxygen content, temperature, pressure, water vapour content</td><td rowspan="4">Continuous measurement</td></tr>
<tr><td>Combustion chamber</td><td>Temperature</td></tr>
<tr><td>Waste water from wet FGC</td><td>Flow, pH, temperature</td></tr>
<tr><td>Waste water from bottom ash treatment plants</td><td>Flow, pH, conductivity</td></tr>
</table>
</td><td></td></tr>
<tr><td>BAT 4</td><td>BAT is to monitor channelled emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.
<table>
<tr><th>Substance/ Parameter</th><th>Process</th><th>Standard(s) ([1])</th><th>Minimum monitoring frequency ([2])</th><th>Monitoring associated with</th></tr>
<tr><td>NO_X</td><td>Incineration of waste</td><td>Generic EN standards</td><td>Continuous</td><td>BAT 29</td></tr>
<tr><td>NH_3</td><td>Incineration of waste when SNCR and/or SCR is used</td><td>Generic EN standards</td><td>Continuous</td><td>BAT 29</td></tr>
<tr><td>N_2O</td><td>• Incineration of waste in fluidised bed furnace
• Incineration of waste when SNCR is operated with urea</td><td>EN 21258 ([3])</td><td>Once every year</td><td>BAT 29</td></tr>
<tr><td>CO</td><td>Incineration of waste</td><td>Generic EN standards</td><td>Continuous</td><td>BAT 29</td></tr>
<tr><td>SO_2</td><td>Incineration of waste</td><td>Generic EN standards</td><td>Continuous</td><td>BAT 27</td></tr>
<tr><td>HCl</td><td>Incineration of waste</td><td>Generic EN standards</td><td>Continuous</td><td>BAT 27</td></tr>
<tr><td>HF</td><td>Incineration of waste</td><td>Generic EN standards</td><td>Continuous ([4])</td><td>BAT 27</td></tr>
<tr><td rowspan="2">Dust</td><td>Bottom ash treatment</td><td>EN 13284-1</td><td>Once every year</td><td>BAT 26</td></tr>
<tr><td>Incineration of waste</td><td>Generic EN standards and EN 13284-2</td><td>Continuous</td><td>BAT 25</td></tr>
<tr><td>Metals and metalloids except mercury (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Tl, V)</td><td>Incineration of waste</td><td>EN 14385</td><td>Once every six months</td><td>BAT 25</td></tr>
<tr><td>Hg</td><td>Incineration of waste</td><td>Generic EN standards and EN 14884</td><td>Continuous ([5])</td><td>BAT 31</td></tr>
<tr><td>TVOC</td><td>Incineration of waste</td><td>Generic EN standards</td><td>Continuous</td><td>BAT 30</td></tr>
<tr><td>PBDD/F</td><td>Incineration of waste ([6])</td><td>No EN standard available</td><td>Once every six months</td><td>BAT 30</td></tr>
</table>
</td><td>Applicable
NOx – will be in place
NH_3 – will be in place.
N_2O – will be measured quarterly.
CO – will be in place
SO_2 – will be in place
HCl – will be in place
HF – will be in place
Dust – will be in place
Metals – will be measured biannually.
Hg – periodic testing will be in place.
TVOC – TOC will be measured continuously.
PBDD/F – Indaver do not accept brominated flame retardants and therefore this is not applicable.
PCDD/F – test regime will be in place
Benzo(a)pyrene – will be tested once a suitable testing method is identified by the regulator. Currently there is no EN standard available.</td></tr>
</table>

Conclusions on BAT					Applicability Assessment

PCDD/F	Incineration of waste	EN 1948-1, EN 1948-2, EN 1948-3	Once every six months for short-term sampling	BAT 30
		No EN standard available for long-term sampling, EN 1948-2, EN 1948-3	Once every month for long-term sampling (7)	BAT 30
Dioxin-like PCBs	Incineration of waste	EN 1948-1, EN 1948-2, EN 1948-4	Once every six months for short-term sampling (8)	BAT 30
		No EN standard available for long-term sampling, EN 1948-2, EN 1948-4	Once every month for long-term sampling (7)(8)	BAT 30
Benzo[*a*]pyrene	Incineration of waste	No EN standard available	Once every year	BAT 30

(1) Generic EN standards for continuous measurements are EN 15267-1, EN 15267-2, EN 15267-3 and EN 14181. EN standards for periodic measurements are given in the table or in the footnotes.
(2) For periodic monitoring, the monitoring frequency does not apply where plant operation would be for the sole purpose of performing an emission measurement.
(3) If continuous monitoring of N_2O is applied, the generic EN standards for continuous measurements apply.
(4) The continuous measurement of HF may be replaced by periodic measurements with a minimum frequency of once every six months if the HCl emission levels are proven to be sufficiently stable. No EN standard is available for the periodic measurement of HF.
(5) For plants incinerating wastes with a proven low and stable mercury content (e.g. mono-streams of waste of a controlled composition), the continuous monitoring of emissions may be replaced by long-term sampling (no EN standard is available for long-term sampling of Hg or periodic measurements with a minimum frequency of once every six months. In the latter case the relevant standard is EN 13211.
(6) The monitoring only applies to the incineration of waste containing brominated flame retardants or to plants using BAT 31 d with continuous injection of bromine.
(7) The monitoring does not apply if the emission levels are proven to be sufficiently stable.
(8) The monitoring does not apply where the emissions of dioxin-like PCBs are proven to be less than 0.01 ng WHO-TEQ/Nm^3.

BAT 5	BAT is to appropriately monitor channelled emissions to air from the incineration plant during OTNOC.	Applicable Measurement campaigns by independent stack testers to be carried out during start-up and shutdown while no waste is being incinerated e.g., every 3 years. Direct emission measurements will be measured continuously by the CEMS for certain parameters. During a controlled shutdown, the continuous emissions monitoring equipment shall be active until all waste will be burned out and removed from the grate.
BAT 6	BAT is to monitor emissions to water from FGC and/or bottom ash treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	Not applicable – there will be no process water emissions from the facility, no water generated by FGC. No bottom ash treatment will take place other than metals removal.

<table>
<tr><th>Conclusions on BAT</th><th>Applicability Assessment</th></tr>
<tr><td>BAT 7</td><td>BAT is to monitor the content of unburnt substances in slags and bottom ashes at the incineration plant with at least the frequency given below and in accordance with EN standards.
<table>
<tr><th>Parameter</th><th>Standard(s)</th><th>Minimum monitoring frequency</th><th>Monitoring associated with</th></tr>
<tr><td>Loss on ignition (1)</td><td>EN 14899 and either EN 15169 or EN 15935</td><td rowspan="2">Once every three months</td><td rowspan="2">BAT 14</td></tr>
<tr><td>Total organic carbon (1) (2)</td><td>EN 14899 and either EN 13137 or EN 15936</td></tr>
<tr><td colspan="4">(1) Either the loss on ignition or the total organic carbon is monitored.
(2) Elemental carbon (e.g. determined according to DIN 19539) may be subtracted from the measurement result.</td></tr>
</table></td><td>Applicable
Monitoring of total organic carbon of residues (bottom ash, boiler ash, and flue gas residue) will take place on a quarterly basis.
Loss of ignition can also be tested if TOC monitoring is not available.</td></tr>
<tr><td>BAT 8</td><td>For the incineration of hazardous waste containing POPs, BAT is to determine the POP content in the output streams (e.g. slags and bottom ashes, flue-gas, waste water) after the commissioning of the incineration plant and after each change that may significantly affect the POP content in the output streams.</td><td>Not applicable – hazardous waste with POP levels prior to incineration exceeding the concentration limits defined in Annex IV to Regulation (EC) No 850/2004 will not be accepted at the facility.
A test programme procedure will be put in place, which ensures for any new type of hazardous waste that has not been previously accepted, a methodology is followed, and a test programme is completed. This test programme will include the classification and characterisation of the residues produced and this would include POP testing as appropriate.</td></tr>
<tr><td colspan="3">5.1.3. General Environmental Combustion Performance</td></tr>
<tr><td>BAT 9</td><td>In order to improve the overall environmental performance of the incineration plant by waste stream management (see BAT 1), BAT is to use all of the techniques (a) to (c) given below, and, where relevant, also techniques (d), (e) and (f).
a) Determination of the types of waste that can be incinerated.
b) Set-up and implementation of waste characterisation and pre-acceptance procedures.
c) Set-up and implementation of waste acceptance procedures
d) Set-up and implementation of a waste tracking system and inventory
e) Waste segregation
f) Verification of waste compatibility prior to the mixing or blending of hazardous wastes</td><td>Applicable
Types of waste that can be incinerated will be defined by the regulator.
Waste characterisation and pre-acceptance procedures will be in place.
Implementation of waste acceptance procedures – Waste deliveries will be monitored as per BAT 11 techniques.
SAP system will be used to track all waste accepted into facility, keeps information on date accepted, type of waste, haz/non-haz, where stored.
Waste segregation – bulk aqueous waste will be stored in a separate area and injected into the furnace at a different point to the municipal waste to ensure better incineration.
All aqueous wastes will be sampled and analysed according to set procedures to ensure that they are compatible for the incineration process and will not pose any risk in terms of process safety, occupational safety and environmental impact.</td></tr>
<tr><td>BAT 10</td><td>In order to improve the overall environmental performance of the bottom ash treatment plant, BAT is to include output quality management features in the EMS (see BAT 1)</td><td>Not applicable – bottom ash treatment will not take place on site (other than metals removal).</td></tr>
<tr><td>BAT 11</td><td>In order to improve the overall environmental performance of the incineration plant, BAT is to monitor the waste deliveries as part of the waste acceptance procedures (see BAT 9 c) including, depending on the risk posed by the incoming waste, the elements given (see BREF).</td><td>Applicable
Procedures will be in place for waste acceptance and handling cover this BAT.</td></tr>
</table>

Conclusions on BAT		Applicability Assessment
BAT 12	In order to reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the techniques given below. a) Impermeable surfaces with an adequate drainage infrastructure b) Adequate waste storage capacity	Applicable Waste will be unloaded in the tipping hall area, the floor of which is composed of hardstanding. Water generated in this area and contained within the waste itself will drain to the waste bunker. The aqueous waste storage area will also be on hardstanding, with drainage that flows to an underground storage tank for process water, kept separate from surface water in line with BAT 32. The volume of waste contained within the bunker will be monitored continuously on DCS system and reported daily to ensure it is within acceptable levels. The waste inputs will be planned to ensure that the bunker is not over capacity.
BAT 13	In order to reduce the environmental risk associated with the storage and handling of clinical waste, BAT is to use a combination of the techniques given below. a) Automated or semi-automated waste handling b) Incineration of non-reusable sealed containers, if used c) Cleaning and disinfection of reusable containers, if used	Not Applicable - Clinical waste is defined as “Infectious or otherwise hazardous waste arising from healthcare institutions e.g., hospitals.” This will not be accepted at the facility.
BAT 14	In order to improve the overall environmental performance of the incineration of waste, to reduce the content of unburnt substances in slags and bottom ashes, and to reduce emissions to air from the incineration of waste, BAT is to use an appropriate combination of the techniques given below. a) Waste blending and mixing b) Advanced control system c) Optimisation of the incineration process The associated monitoring is BAT 7.	Applicable Waste blending and mixing prior to incineration will be carried out as follows: Waste cranes will mix solid waste in the bunker prior to feeding to the hopper to give a homogeneous solid waste feed. Waste pushers at the bottom of the chute connecting the hopper with the furnace will control the speed and amount of solid waste feed to the furnace. Bulk liquid wastes will be fed to the furnace at rates of between 0.5 and 2 tonnes per hour depending on the process conditions at the time and this is dictated by the control room operators. DCS computer system will automatically monitor and control combustion efficiency and support the prevention and/or reduction of emissions. Optimisation of the design is done during the tender process between Indaver and plant suppliers to balance the requirements of plant performance/reliability, energy efficiency, raw materials usage, emission limits and overall environmental performance. Note 2 states that the lower end of the BAT-AEPL range for TOC and LOI is applicable to fluidised bed furnaces and rotary kiln incinerators, so not applicable to this facility.

Conclusions on BAT		Applicability Assessment
BAT 15	In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and implement procedures for the adjustment of the plant's settings, e.g. through the advanced control system (see description in Section 5.2.1), as and when needed and practicable, based on the characterisation and control of the waste (see BAT 11).	Applicable Indaver will employ a process engineer whose role it is to monitor the process conditions and create changes when needed. Regular reporting of the environmental performance of the facility will be reviewed by senior management and action taken as required by the Production Manager and/or the Process Engineer, to investigate the reasons for any deviations or negative trends and to make the necessary process adjustments as required. There will be multiple methods in place for this- morning meetings, weekly meetings, one to one meetings, work order systems, request for changes through automation, KPI's etc.
BAT 16	In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and implement operational procedures (e.g., organisation of the supply chain, continuous rather than batch operation) to limit as far as practicable shutdown and start-up operations.	Applicable Monitoring of plant availability will give KPI's for shutdowns. Try to reduce start-up/shutdowns as much as possible through good maintenance (preventative and corrective) programme also. There will be multiple procedures, process maps and manuals in place for ensuring the plant works continuously e.g., creating sales orders for MSW (municipal solid waste), commercial sales for regional sales, waste acceptance, waste handling, waste profiling, non-conformity process maps etc. All of these will be part of standard processes.
BAT 17	In order to reduce emissions to air and, where relevant, to water from the incineration plant, BAT is to ensure that the FGC system and the wastewater treatment plant are appropriately designed (e.g. considering the maximum flow rate and pollutant concentrations), operated within their design range, and maintained so as to ensure optimal availability.	Applicable FGC system has been designed to appropriately remove pollutants and will be operated within design range. There will be no wastewater emissions from the FGC, it is a dry sorbent process. Wastewater from floor washing will be reused in the process.
BAT 18	In order to reduce the frequency of the occurrence of OTNOC and to reduce emissions to air and, where relevant, to water from the incineration plant during OTNOC, BAT is to set up and implement a risk-based OTNOC management plan as part of the environmental management system (see BAT 1) that includes all of the following elements: • identification of potential OTNOC (e.g., failure of equipment critical to the protection of the environment ('critical equipment')), of their root causes and of their potential consequences, and regular review and update of the list of identified OTNOC following the periodic assessment below. • appropriate design of critical equipment (e.g., compartmentalisation of the bag filter, techniques to heat up the flue-gas and obviate the need to bypass the bag filter during start-up and shutdown, etc.); • set-up and implementation of a preventive maintenance plan for critical equipment (see BAT 1 xii); • monitoring and recording of emissions during OTNOC and associated circumstances (see BAT 5); • periodic assessment of the emissions occurring during OTNOC (e.g., frequency of events, duration, amount of pollutants emitted) and implementation of corrective actions if necessary.	Applicable OTNOC management plan will be prepared and implemented.

Conclusions on BAT		Applicability Assessment
5.1.4. Energy Efficiency		
BAT 19	In order to increase the resource efficiency of the incineration plant, BAT is to use a heat recovery boiler.	Applicable A heat recovery boiler will be in place.
BAT 20	In order to increase the energy efficiency of the incineration plant, BAT is to use an appropriate combination of the techniques given below. a) Drying of sewage sludge b) Reduction of the flue-gas flow c) Minimisation of heat losses d) Optimisation of the boiler design e) Low-temperature flue-gas heat exchanger f) High steam conditions g) Cogeneration h) Flue-gas condenser i) Dry bottom ash handling The associated monitoring is BAT 2.	Applicable a) Not applicable b) Will be in place c) Will be in place- insulation of the furnace and boilers d) Will be in place (boiler cleaning, on/offline) e) Not applicable f) Will be in place g) Will be investigated. h) Not applicable i) Not applicable
5.1.5. Emissions to Air		
5.1.5.1. Diffuse Emissions		
BAT 21	In order to prevent or reduce diffuse emissions from the incineration plant, including odour emissions, BAT is to: • store solid and bulk pasty wastes that are odorous and/or prone to releasing volatile substances in enclosed buildings under controlled sub atmospheric pressure and use the extracted air as combustion air for incineration or send it to another suitable abatement system in the case of a risk of explosion; • store liquid wastes in tanks under appropriate controlled pressure and duct the tank vents to the combustion air feed or to another suitable abatement system; • control the risk of odour during complete shutdown periods when no incineration capacity is available, e.g., by: • sending the vented or extracted air to an alternative abatement system, e.g., a wet scrubber, a fixed adsorption bed; • minimising the amount of waste in storage, e.g., by interrupting, reducing or transferring waste deliveries, as a part of waste stream management (see BAT 9); • storing waste in properly sealed bales.	Applicable All solid wastes and sludges will be stored in the bunker which is within an enclosed building from where primary air for the furnace is extracted when the plant is in operation. Aqueous Bulk liquid wastes will be stored in a closed tank. Bulk Liquid wastes will be pumped to the furnace from this tank or can also be fed directly from an incoming tanker delivery by way of direct injection. An odour abatement system will be in place for when the plant is in planned or unplanned shutdown. There will be a reduction in intake of waste during shutdowns to ensure odour is controlled also.

Conclusions on BAT		Applicability Assessment
BAT 22	In order to prevent diffuse emissions of volatile compounds from the handling of gaseous and liquid wastes that are odorous and/or prone to releasing volatile substances at incineration plants, BAT is to feed them to the furnace by direct feeding.	Applicable In the event that any particularly odorous bulk liquid wastes are being accepted, diffuse emissions can be prevented by utilising the direct injection system from the tanker to the furnace (see BAT 21 also).
BAT 23	In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to include in the environmental management system (see BAT 1) the following diffuse dust emissions management features: • identification of the most relevant diffuse dust emission sources (e.g., using EN 15445); • definition and implementation of appropriate actions and techniques to prevent or reduce diffuse emissions over a given time frame.	Not Applicable. Only metals removal will be carried out on the bottom ash. Bottom ash will be collected in an indoor hall.
BAT 24	In order to prevent or reduce diffuse dust emissions to air from the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below. a) Enclose and cover equipment. b) Limit height of discharge c) Protect stockpiles against prevailing winds. d) Use water sprays. e) Optimise moisture content. f) Operate under sub-atmospheric pressure	Not Applicable. Only metals removal will be carried out on the bottom ash. Bottom ash will be collected in an indoor hall.
5.1.5.2. Channelled Emissions		
5.1.5.2.1. Emissions of dust, metals and metalloids		
BAT 25	In order to reduce channelled emissions to air of dust, metals and metalloids from the incineration of waste, BAT is to use one or a combination of the techniques given below. a) Bag filter b) Electrostatic precipitator c) Dry sorbent injection d) Wet scrubber e) Fixed- or moving-bed adsorption. The associated monitoring is in BAT 4.	Applicable The facility will have the following. a) Multi-compartment bag house filter b) Not applicable c) Dry hydrated lime and activated carbon/clay injection d) Not applicable e) Not applicable A multi-compartment bag house filter will be installed for the reduction of dust in the flue gases. Dry sorbent injection (activated carbon and clay mixture) will be utilised for the reduction of metals in the flue gases.
BAT 26	In order to reduce channelled dust emissions to air from the enclosed treatment of slags and bottom ashes with extraction of air (see BAT 24 f), BAT is to treat the extracted air with a bag filter (see Section 5.2.2).	Not Applicable.

Conclusions on BAT		Applicability Assessment
	The associated monitoring is in BAT 4.	Only metals removal will be carried out on the bottom ash. Bottom ash will be collected in an indoor hall.
5.1.5.2.2. Emissions of HCl, HF and SO_2		
BAT 27	In order to reduce channelled emissions of HCl, HF and SO2 to air from the incineration of waste, BAT is to use one or a combination of the techniques given below. a) Wet scrubber b) Semi-wet absorber c) Dry sorbent injection d) Direct desulphurisation e) Boiler sorbent injection	Applicable Dry sorbent injection will be used in the process to control acids.
BAT 28	In order to reduce channelled peak emissions of HCl, HF and SO2 to air from the incineration of waste while limiting the consumption of reagents and the amount of residues generated from dry sorbent injection and semi-wet absorbers, BAT is to use technique (a) or both of the techniques given below. a) Optimised and automated reagent dosage b) Recirculation of reagents The associated monitoring is in BAT 4.	Applicable The use of sorbent will be optimised using continuous upstream and downstream monitoring of HCl and SO_2. Flue gas cleaning residues will be conditioned and recirculated to reduce stoichiometric factor and manage peaks emissions of HCl, HF & SO_2.
5.1.5.2.3. Emissions of NOx, N_2O, CO and NH_3		
BAT 29	In order to reduce channelled NOX emissions to air while limiting the emissions of CO and N2O from the incineration of waste and the emissions of NH3 from the use of SNCR and/or SCR, BAT is to use an appropriate combination of the techniques given below. a) Optimisation of the incineration process b) Flue-gas recirculation c) Selective non-catalytic reduction (SNCR) d) Selective catalytic reduction (SCR) e) Catalytic filter bags f) Optimisation of the SNCR/SCR design and operation g) Wet scrubber The associated monitoring is in BAT 4.	Applicable The following techniques will be in place to reduce the channelled emissions of NO_x. (a) Optimisation of the incineration process. Flow modelling will be performed during the boiler design in order to: (i) optimise furnace and boiler geometry so as to improve combustion performance (ii) optimise combustion air injection so as to improve combustion performance The excess oxygen in the post combustion chamber will be ~ 6 vol %. This is a compromise between enough air to control the CO-peaks and too much air to avoid primary NO_x forming. (c) Use of Selective non-catalytic reduction (SNCR). This technique will be applied in preference to SCR in favour of the overall energy balance of the installation.

Conclusions on BAT		Applicability Assessment
		(f) Optimisation of the SNCR design and operation. Use of CFD modelling in the design phase will optimise reagent injection points of the SNCR system so as to improve the efficiency of NO_x abatement whilst minimising the generation of nitrous oxide, ammonia and the consumption of reagent. Additional injection points will be installed during regular outages at the plant to drive improvement and to reduce ammonia consumption. The flow of the SNCR reagent will be designed to get a full coverage of the cross section of the post combustion chamber.
5.1.5.2.4. Emissions of Organic Compounds		
BAT 30	In order to reduce channelled emissions to air of organic compounds including PCDD/F and PCBs from the incineration of waste, BAT is to use techniques (a), (b), (c), (d), and one or a combination of techniques (e) to (i) given below. a) Optimisation of the incineration process b) Control of the waste feed c) On-line and off-line boiler cleaning d) Rapid flue-gas cooling e) Dry sorbent injection f) Fixed- or moving-bed adsorption. g) SCR h) Catalytic filter bags i) Carbon sorbent in a wet scrubber The associated monitoring is BAT 4.	Applicable a, c d, and e apply. (a) Optimisation of the incineration process. Well-controlled combustion secured by means of flow modelling (see BAT 14 & BAT 29 above) at the design stage, and an advanced combustion control system to aid the reduction of PCDD/F and its precursors. The 3 T's are applied: Temperature is higher than 850°C ; residence Time of the flue gas is at least 2 s and the Turbulence is actively realised by the in speed velocity and orientation of the secondary air in the post combustion chamber. (c) On-line and off-line boiler cleaning. As listed in BAT 20 fixed boiler cleaning systems will be installed to reduce the amount of fly ash remaining in the boiler. (d) Rapid Flue Gas Cooling. During normal operation, the temperature in the three empty passes of the boiler will be above 600 °C. When entering the convection pass, the flue gas will be cooled very rapidly due to the large heat convection surfaces. This reduces the dust-laden gas residence time in the temperature zone from 450 to 250°C, in which zone PCDD/F is likely to reform (the de-novo synthesis). (e) Dry Sorbent Injection. As per BAT 25, an activated carbon and clay mixture will be employed as part of the process in conjunction with a baghouse filter.
5.1.5.2.5. Emissions of Mercury		
BAT 31	In order to reduce channelled mercury emissions to air (including mercury emission peaks) from the incineration of waste, BAT is to use one or a combination of the techniques given below. a) Wet scrubber (low pH) b) Dry sorbent injection c) Injection of special, highly reactive activated carbon	Applicable The reduction of the channelled emissions of Mercury, the following technique will be in place. (b) Dry Sorbent Injection. As per BAT 25, an activated carbon and clay mixture will be in place as part of the process in conjunction with a baghouse filter.

Conclusions on BAT		Applicability Assessment
	d) Boiler bromine addition e) Fixed- or moving-bed adsorption. f) The associated monitoring is in BAT 4.	
5.1.6. Emissions to Water		
BAT 32	In order to prevent the contamination of uncontaminated water, to reduce emissions to water, and to increase resource efficiency, BAT is to segregate wastewater streams and to treat them separately, depending on their characteristics.	Applicable Wastewater from the process (boiler blow down, floor washings etc) will be collected in a dedicated network and will eventually drain to a tank. The boiler blowdown will be used as water for the bottom ash cooling in the wet de-slagger. The floor washings will be stored for re-use in the wet de-slagger also. There will be very little water from the bottom ash but it will be kept in an area with contained drainage with no connection to the process water drainage system or the stormwater collection system on site. The storm water from all of the roads, roofs and hard standings will be conveyed via a class 1 hydrocarbon interceptor and tested for pH, conductivity and TOC.
BAT 33	In order to reduce water usage and to prevent or reduce the generation of wastewater from the incineration plant, BAT is to use one or a combination of the techniques given below. a) Waste-water-free FGC techniques b) Injection of wastewater from FGC c) Water reuse/recycling d) Dry bottom ash handling	Applicable In order to reduce water usage and to prevent or reduce the generation of wastewater from the incineration plant, the following techniques will be employed. (a) Wastewater free Flue Gas Cleaning Techniques. Dry sorbent injection will be used as per BAT 25. (c) Water re-use/recycling. Wastewater from the process will be re-used in the wet-deslagger system. See BAT 32 also.
BAT 34	In order to reduce emissions to water from FGC and/or from the storage and treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below (in the Bref document), and to use secondary techniques as close as possible to the source in order to avoid dilution. The associated monitoring is in BAT 6.	Not Applicable. There are no emissions to water from the flue gas cleaning or bottom ash storage on site.
5.1.7. Material Efficiency		
BAT 35	In order to increase resource efficiency, BAT is to handle and treat bottom ashes separately from FGC residues.	Applicable Bottom ashes will be collected separately and stored in a dedicated bottom ash storage building prior to transport off-site for treatment or recovery. Flue Gas Cleaning residues will be collected in separate silos for further treatment. There will be no mixing of these residues.

Conclusions on BAT		Applicability Assessment
BAT 36	In order to increase resource efficiency for the treatment of slags and bottom ashes, BAT is to use an appropriate combination of the techniques given below based on a risk assessment depending on the hazardous properties of the slags and bottom ashes. a) Screening and sieving b) Crushing c) Aeraulic separation d) Recovery of ferrous and non-ferrous metals e) Ageing f) Washing	Not Applicable. Only metals removal will be carried out on the bottom ash.
5.1.8. Noise		
BAT 37	In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques given below. a) Appropriate location of equipment and buildings b) Operational measures c) Low-noise equipment d) Noise attenuation e) Noise-control equipment/ infrastructure	Applicable a) Appropriate location of equipment & buildings. The orientation of the plant and the location of the main process building, and ancillary equipment was considered during the planning/preliminary design stage from a noise reduction perspective. b) Operational Measures. Standard maintenance procedures including condition monitoring of equipment will ensure that noise levels of relevant equipment are maintained within their design ranges. c) Low Noise Equipment. As a basic standard, Indaver define 82dB at 1m from all process equipment to suppliers. d) Noise Attenuation. The following noise reduction measures will be implemented to meet local noise requirements: (i) An enclosed waste tipping hall will significantly reduce the noise from unloading of waste. (ii) Noisy process equipment will be located inside the main process building or in its own enclosure/building (e.g., turbine). (iii) Separate noise attenuating housing or insulation of equipment with higher noise production (higher than 82 dB at 1 m) such as the tail end fan, hydraulic units, air compressor, turbine. e) Noise-control equipment/infrastructure. (i) Noise damper between tail end fan and stack. (ii) Noise dampers of steam valves to atmosphere except for valves with a safety function. (iii) Frequency driven motors to avoid unnecessary high rotation speed of higher noise generating equipment.

Conclusions on BAT		Applicability Assessment
		(iv) Low noise fan blades for the air-cooled condenser.