FICHTNER

Consulting Engineers Limited

Avonmouth High Temperature Incinerator

Grundon Waste Management Ltd

Supporting information – EP Variation

ENGINEERING CONSULTING

Document approval

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1 Introduction

An Environmental Permit (EP) was granted by the Environment Agency (EA) to New Earth Energy (West) Operations Limited for the operation of the Avonmouth Energy Facility in January 2013. The EP includes for the operation of a Schedule 1, Section 5.1 (A1) (c) activity:

The incineration of non-hazardous waste in a pyrolysis and gasifier plant with a capacity of 1 tonne or more per hour

The EP was subsequently transferred to Avonmouth Bio Power Limited in October 2015.

Whilst the gasification plant was constructed and commissioned, it did not operate as it was intended. The gasification plant was eventually mothballed by Avonmouth Bio Power Limited in 2016. Grundon Waste Management Limited (Grundon) subsequently acquired the site from Avonmouth Bio Power Limited in February 2021.

Grundon has removed all of the gasification process equipment, including the waste feed and flue gas treatment systems. Grundon is currently installing a new waste incineration combustion technology, and associated waste and flue gas treatment systems to process a mix of non-hazardous, clinical and hazardous wastes which require high temperature incineration, herein referred to as the Facility.

Within this application, Grundon is applying for a Variation to the EP to allow for the high temperature incineration of hazardous and non-hazardous wastes. This document and its appendices contain the supporting information for the application for an Environmental Permit (EP) for the Facility. They should be read in conjunction with the formal application form. Within section 1, we have provided an overview of the application; section 2 provides a summary of the proposed waste incineration technology and the associated Operating Techniques for the Facility; and section 3 provides further information in response to specific questions within the Environment Agency's application form. In addition, a number of technical assessments and supporting documentation to support the determination process.

1.1 The Applicant

Grundon is one of the UKs leading recycling and waste management companies and is the named Operator of the Facility. Grundon is registered in England (Company Number: 04245965) and has a registered address of Thames House, Oxford Road, Benson, Wallingford, Oxfordshire, OX10 6LX.

Grundon owns and operates multiple industry-leading facilities enabling environmentally friendly methods of recycling and waste disposal. These facilities include Energy from Waste (EfW), High Temperature Incinerator (HTI) and Materials Recovery Facilities (MRFs), treatment plants and transfer stations, among others. Grundon operates the Lakeside HTI facility.

1.2 The Site

The Site is located on Zinc Road, Avonmouth, BS11 8AZ, and is located within the industrial area of Avonmouth, behind the ASDA Retail Distribution Centre, accessed off Kings Weston Lane in Avonmouth. Junction 18/18A of the M5 motorway is approx. 1 mile to the South. The M4/M5 interchange is approx. 7 miles to the North. Avonmouth Docks are within 1 mile of the site and Bristol City Centre is 10 miles to the East via the A4 Portway.

All of the activities associated with the operation of the Facility will be undertaken within the existing installation boundary, and this application does not propose any changes to the installation

boundary. A revised installation boundary drawing, incorporating the proposed waste incineration technology is provided in Appendix A.

1.3 The Application

The Environment Agency's guidance on Charging Schemes states that there are four types of variations – administrative, minor technical, normal and substantial.

Grundon acknowledges that the proposed changes will not constitute either an administrative or minor technical variation.

The Environment Agency has published guidance (Regulatory Guidance Note 8 – Substantial Change) which defines a substantial change. It is acknowledged that the guidance has subsequently been withdrawn but any replacement guidance is not as prescriptive. The guidance defined a substantial change as:

'… a change in operation of installations or mining waste facilities, which in our opinion may have significant negative effects on human beings or the environment. Certain changes are automatically regarded as substantial, namely:

a. a change in operation of a Part A installation which in itself meets the thresholds, if any, set out in Part 2 of Schedule 1 EPRs; or

b. a change in operation of an incineration or co-incineration plant for non-hazardous waste which would involve the incineration or co-incineration of hazardous waste.'

As explained in section 1.4, the proposed 'activity' is different to the 'activity' stated in Table S1.1 of the existing EP. Therefore, Grundon acknowledges that the application should be determined as a Substantial Variation.

1.4 The Activities

The Facility will consist of two Schedule 1 installation activity (as defined in the Environmental Permitting Regulations) and directly associated activities. These include:

- waste incineration plant, including the processing of incoming clinical, hazardous and non-hazardous waste which is delivered to the Facility via road;
- treatment of flue gases generated from the combustion of the waste fuels;
- production of bottom ash material that will be transferred off-site for disposal in landfill;
- generation of an air pollution control residue (APCr) that will be transferred off-site to a suitably licensed hazardous waste facility for disposal; and
- the repackaging of hazardous wastes for transfer off-site to a suitably licenced waste disposal/recovery facility.

The following table lists the Scheduled activities from the Environmental Permitting Regulations, and directly associated activities.

Table 1: Scheduled and directly associated activities

Type of Activity	Schedule 1 Activity	Description of Activity
Installation	Section 5.1, Part A(1) (a)	The incineration of hazardous waste and non-hazardous in a waste incineration plant with a capacity of 2.5 tonnes/hour.

Type of Activity	Schedule 1 Activity	Description of Activity
Installation	S5.3 Part A(1) (a) (iv) Repackaging of hazardous waste: **R12** Exchange of waste for submission to any of the operations numbered R1 to R11 (repackaging) **D14** Repackaging prior to submission to any of the operations numbered D1 to D13	Repackaging is limited to: • taking a waste package (for example a bag, jar, drum or box) out of one cart or bulk container (for example a skip) and placing it into another cart or bulk container (for example, a skip) • taking a waste package from a cart or bulk container (for example, skip) and placing it onto a pallet or vehicle • taking a waste package from a pallet and placing it into a cart or bulk container (for example, skip) • transferring, removing or separating waste from its primary packaging (for example container, bags, bins, boxes). Healthcare waste shall not be transferred, removed or separated from its original packaging. Wastes that are combined together during repackaging activities shall have the same EWC code and similar chemical composition. The repackaging of wastes shall not result in: • any incompatible wastes being repackaged together in the same container • a reaction of repackaged wastes with each other • a reaction with the container in which the wastes are being placed. Repackaging shall take place within a building on an impermeable surface with sealed drainage. Fugitive emissions shall be minimised during repackaging. Repackaging of waste shall not change either the maximum storage times for waste on site or the amount that can be stored at any one time.
Directly associated activities		
Directly Associated Activities		The receipt, storage and handling of non-hazardous, hazardous and clinical waste prior to incineration.

Type of Activity	Schedule 1 Activity	Description of Activity
Directly Associated Activities		The handling, storage and transfer of residues for transfer off-site.
Directly Associated Activities		Energy recovery via a steam boiler, steam turbine and generator producing electricity.
Directly Associated Activities		Bin washer
Directly Associated Activities		Standby electrical generation to provide electrical power to the plant in the event of an interruption in the supply.

The Stationary Technical Unit (the Facility) includes waste reception and preparation; waste storage; water, fuel oil and air supply systems; a rotary kiln combustion system including steam boiler; facilities for the treatment of exhaust gases; on-site facilities for treatment or storage of residues and wastewater; stack; and devices and systems for controlling the combustion process and monitoring emissions.

The capacity of the Facility will be approximately 60 tonnes per day (2.5 tonnes per hour) of non-hazardous and hazardous wastes, with a net calorific value (NCV) of 26MJ/kg. A firing diagram for the combustion technology is provided in Figure 1:

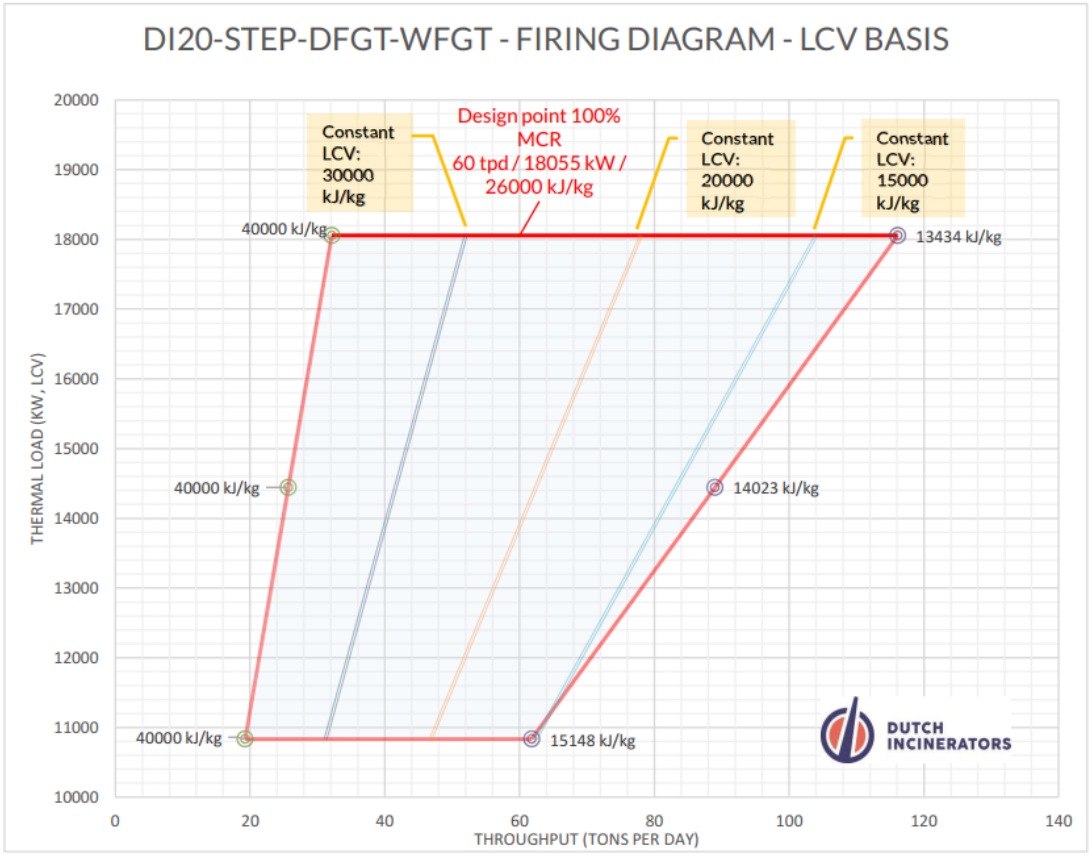


Figure 1: Firing diagram

The Facility will have an availability of approximately 8,000 hours per annum. Therefore, the Facility will have a nominal design capacity of approximately 20,000 tonnes per annum (tpa). However, allowing for the Facility operating on a low range NCV (<20 MJ/kg) the Facility could process up to 28,500 tpa. Therefore, the maximum capacity of the Facility is 28,500 tpa.

2 The Facility

The main activities associated with the Facility will be the combustion of incoming waste. The waste incineration process will be based around process areas comprising the following facilities among others: waste reception and waste storage area, various waste feeding systems, rotary kiln furnace, high temperature secondary combustion zone, a waste heat recovery boiler, a steam turbine, dry and wet flue gas treatment (FGT) systems with the treated flue gases being monitored prior to release to atmosphere via a dedicated stack which will be 36.5m. In addition, the Facility will include a control room, and offices and welfare facilities.

Allowing for the maximum capacity of the Facility and an NCV of 26MJ/kg, the boiler will have a thermal capacity of approximately 20MWth.

2.1 Raw Materials

The Facility will receive deliveries of incoming waste by road. The Facility will also use consumables including:

- lime;
- urea solution (40%);
- powdered activated carbon (PAC);
- sodium hydroxide;
- auxiliary fuel; and,
- other boiler treatment chemicals.

2.1.1 Reagents and auxiliary fuels

Hydrated lime, used to react with acid gases in the dry flue gas treatment (DFGT) process, will be stored in silos on site. Delivery of lime will be via tanker, with pneumatic offloading by means of an on-board truck compressor into the silo. Displaced air will be vented to the atmosphere through a fabric filter located on top of the silo. The lime will then be transported pneumatically to be injected into the flue gas stream.

PAC will be used for the absorption of volatile heavy metals, volatile organic compounds and dioxins and will be added with the lime in the DFGT process. The PAC will be delivered by road and stored in sealed bags/sacks in a designated storage area or in a suitably designed silo. A dosing tank/silo will be installed, with a top inlet flange for top loading. A lifting structure with electrical hoist will enable lifting of the bags to the top of the dosing silo, where the bags can be discharged directly into the silo via the top inlet flange.

An SNCR reagent, urea solution, used for NOx reduction through SNCR, will be stored in a designated area which is provided with suitable secondary containment. The urea solution (40%) will be delivered via road and stored in a dedicated urea storage tank. An IBA of ammonia solution may also be stored on-site in the event that additional NOx abatement dosing is required.

All consumables (lime, urea and PAC) will be delivered to the Facility by road.

The combustion burners will be fuelled by low sulphur fuel oil, which will be stored in a new fuel oil tank which is located adjacent to the HTI building and near the location of the previous fuel oil tank.

All liquid chemicals will be stored in controlled areas, with secondary containment facilities for hazardous materials having a volume of 110% of the stored capacity.

Silos will be fitted with high level alarms and the level regularly monitored. The top of the silos will be equipped with a vent fitted with a fabric filter. Cleaning of the filter will be done automatically with compressed air after the filling operation. Filters will be inspected regularly for leaks.

High quality boiler feedwater will be supplied in the form of return condensate from the air-cooled condenser and from an onsite water treatment plant. Boiler treatment chemicals will be present in small quantities on site, stored in suitable storage facilities.

In addition to the raw materials described above, various maintenance materials will be stored in an appropriate manner and used in small quantities. These will include hydraulic and silicone-based oils, greases, insulants, refrigerant gases for the air conditioning plant, glycol/antifreeze for cooling, welding gases (oxyacetylene, TIG, MIG), CO_2 and foam agents for fire-fighting, electrical switchgear and gas emptying and filling equipment.

2.1.2 Waste Reception and Preparation

Due to the capability of the HTI, the Facility will receive a very wide range of both hazardous and non-hazardous wastes. The capability and diversity of the waste types that can be treated are reflected in the EWC codes included within this application.

The majority of the incoming waste will be delivered to the Facility via road in enclosed packages, including wheeled bins, fibre board, plastic and steel drums, IBCs, boxes, sacks and bulk bags. The Facility will also receive bulk aqueous and organic liquids wastes, for direct injection into the kiln. Compressed gas cylinders will also be accommodated; their contents being directly injected into the kiln, using a dedicated connection and transfer system.

In addition, the Facility will receive mixed loads of hazardous and non-hazardous wastes. A proportion of the mixed loads are unlikely to be suitable for treatment within the Facility. The materials which are unsuitable for treatment within the Facility will be transferred off-site for disposal or recovery at alternative waste management operations.

A waste tracking system will be implemented at the Facility, using a barcode (or equivalent) system to provide traceability of the receipt and treatment / storage status of consignments.

An on-site laboratory will be established, enabling the analysis of samples of wastes that are destined for high temperature incineration or transfer off-site.

All waste reception and handling operations will be completed within the building, on a solid impermeable surface. All wastes will be stored in in bays equipped with 3m high fire walls. Only chemical compatible wastes will be stored in the same bay. Each bay will be equipped with a small sump at the rear and the bay itself will be able to contain 110% of the volume of the largest package.

The potential diversity of incoming wastes will necessitate thorough pre-acceptance and acceptance procedures, during which the chemical characterisation and onward routing of wastes will be determined. The majority of waste consignments will be pre-booked prior to receipt; the greatest exception being loads of healthcare wastes that are typically uniform.

Waste stock levels will be assessed daily, to ensure that there is sufficient storage capacity available to receive consignments on forthcoming days. All waste packages will be clearly labelled, providing details of the waste contents and the associated hazards. If not shown on the label, consignment details will be available from the waste tracking system.

Wastes will be inspected on arrival, with a range on on-site verification checks being completed. These will include visual inspections, odour checks (where safe to do so), the use of chemical test strips and the use of both portable and fixed analytical equipment.

2.1.2.1 Packaged wastes

Packaged wastes will be received in a range of packaging types of varying sizes/capacities. Package wastes will comprise of paint, inks and other coating wastes, oil sludges, resins and adhesives, contaminated rags and absorbents, filtercakes, contaminated wood, healthcare, research and biotechnology wastes, agrochemicals, laboratory chemicals, POPs contaminated wastes and contaminated packaging.

On receipt, packaged wastes will be accepted by trained chemists, who will undertake on-site verification checks to ensure that they are as expected and as described by the waste producer.

Wastes received for incineration will be stored in bays equipped with 3m high fire walls. Only chemical compatible wastes will be stored in the same bay. Each bay will be equipped with a small sump at the rear and the bay itself will be able to contain 110% of the volume of the largest package.

Wastes for other disposal or recovery processes will be stored in different bays, constructed to the same specification as above, prior to being transfer off-site.

Whilst the HTI is designed to treat wastes with an average NCV of 26 MJ/kg, it is able to accommodate wastes in large packages with an average NCV of up to 40 MJ/kg (mixed hydrocarbons) down to as low as 15 MJ/kg.

The Facility Chemists will endeavour to present the HTI with as uniform a feed as possible, accepting there will be differences between packages.

To assist with achieving uniform loading, wastes that are suitable for shredding and hydraulic pumping will be routed to a pre-treatment system - shredding and pumping (S&P) system – to be fed into the kiln. Examples of these wastes include paint, oil, adhesive and resin sludges, contaminated absorbents, and filter cakes which can contain a proportion of free liquid. The S&P system is not designed to manage large packages with over 50% free liquid. For wastes with more than 50% free liquid, most of the liquid will be removed/pumped off prior to pre-treatment in the S&P system. Only chemically compatible wastes will be treated at the same time, avoiding the potential for chemical reactions e.g. polymerisation, which could potentially block the feed pipes.

Other loading mechanisms include the feed by the bin/drum lift into the hopper which will be loaded directly into the kiln. This will be used primarily, but not exclusively, for the management of bins containing healthcare wastes, contaminated solids, small packages and laboratory chemicals. It will also be able to accommodate drums (up to 205 litres).

The S&P system will help to provide the HTI with as homogeneous waste feed as feasible and reduce the impact of wastes with high NCV's or contaminant loadings being fed into the combustion system.

To maintain a homogeneous feedstock, the Facility will store a wide range of waste feedstocks, enabling the selection of appropriate wastes to offset the effects of wastes with specifications outside the 'normal' range. The Facility Chemists will develop blends of waste types which can be processed for specific periods of time to enable a blended approach to the waste feed.

To facilitate efficient uniformity of loading, a limited amount of bulking and decanting of wastes will take place. The majority of this will involve the accumulation of small packages of similar, chemically compatible wastes into larger packagings e.g. the bulking of small boxes, bags or bottles into a larger drum. This activity will be undertaken with both hazardous and non-hazardous wastes. Whilst packages of hazardous and non-hazardous wastes will not be mixed, as long as chemical compatibility is maintained, the bulking of packages with different EWC codes will take place e.g. a drum could contain flammable solvent based paints, inks and adhesives (EWC codes 08 01 11*, 08 03 12* and 08 04 09*).

Prepared loads will be stored in bays, constructed to the same specifications as above, close to the S&P system and bin/drum lift. Packages will be selected by the Operatives in a pre-determined order, ensuring the overall blend is as consistent as possible.

2.1.2.2 Bulk liquids

The fuel feed system will include liquid injection lances located at the top section of the kiln / base of the secondary combustion chamber, for the introduction of organic and aqueous liquids. These will benefit the combustion process by either introducing energy to raise temperatures (high NCV organic wastes), or to cool the process (low NCV aqueous wastes). The HTI control philosophy will call upon these waste streams as and when required, serving their specific purposes.

The organic wastes and aqueous wastes will be stored in separate 30,000 litre cone bottomed bulk storage tanks, located outside the HTI building. The top voids within the tanks will be blanketed with nitrogen and the contents of each tank circulated using an external centrifugal pump.

Bulk liquids will only injected as required by the combustion process, and deliveries are likely to be ad-hoc, depending on commercial factors including availability and demand of these wastes.

Pre-acceptance and acceptance tests will be undertaken on the wastes prior to them being delivered to the Facility and transferred into the storage tanks.

2.1.2.3 Compressed gases

An injection lance will be provided for the introduction of individual compressed gases, or pre-prepared mixtures of compressed gases, into the top section of the kiln/base of the secondary combustion chamber.

Gas types will include inorganic and organic chemicals, some of which will be energetic and/or reactive. To avoid the potential for reaction, only one cylinder will be attached to the feed manifold at any time. The feed line will be purged with nitrogen each time there is a change in the gas feed type.

2.1.3 Waste Transfer

The installation will receive mixed loads of hazardous and non-hazardous wastes, of which a proportion will not be suitable for treatment at the Facility. These materials will be transferred off-site for disposal or recovery at alternative permitted waste management facilities.

Due to the wide range of chemical properties and associated hazards, to ensure chemical compatibility, it's likely that several internal storage bays will be dedicated to the temporary storage of wastes pending transfer. Bays will be appropriately marked, indicating the chemical classes they're able to accommodate.

Whilst efforts will be made to minimise the length of time that wastes are stored on-site, it may take some time to accumulate suitable sized consignments for transfer off-site. This, along with the potential need to account for operational issues at other disposal and recovery facilities, the Facility will potentially require the storage of wastes for up to 6 months prior to transfer off-site.

2.2 Combustion Process

Solid waste is supplied into the primary combustion section of the process via the elevator or pipeline. High and low calorific liquid wastes can be supplied to the primary or secondary

combustion sections, depending upon process demand and waste properties. Liquid and gaseous wastes originating from gas bottles are supplied directly to the secondary combustion section.

The combustible gases produced by the partial combustion of the waste in the primary combustion section are mixed with secondary air introduced at the front of the kiln and burn out completely in the post combustion chambers. High calorific liquid waste can be injected at the inlet side of the post combustion section to raise the flue gas temperature as it exits the stationary zone of the primary combustion.

In the rotary kiln a nominal temperature is maintained at around 900 to 1150°C. Flue gas leaving the rotary kiln directly preheats the new waste supplied to the kiln.

The flue gas generated in the primary combustion chamber is supplied to a vertical secondary combustion chamber. The minimum operating temperature in the secondary combustion chamber is 1100 °C and will have residence time of at least 2 seconds as the Facility will be processing hazardous wastes.

A fuel oil fired post combustion burner will ensure that the temperature within the secondary combustion chamber is maintained above 1100 °C.

The dosing rate of urea solution will be controlled to minimise ammonia slip, whilst reducing the concentration of NOx in the flue gas to achieve required emission limits. NOx will be chemically reduced to nitrogen, carbon dioxide and water.

The flue gases from the secondary combustion chamber will then pass to a waste heat recovery boiler – refer to section 2.3.

Excess oxygen content in the flue gas will be measured to control air flow for combustion. This will maximise the efficiency of the heat recovery process whilst maintaining combustion efficiency.

2.3 Energy Recovery

The flue gas will flow from the post combustion chamber to the primary cooling (energy recovery) stage at a nominal 1100 °C, maximum 1200°C.

The hot flue gases are cooled down in a water tube boiler section, transferring energy to produce saturated steam at 21 bar(a) and 215°C. The saturated steam is supplied to a steam turbine and generator set, to generate electricity. The Facility will generate approximately 1.5 MWe, and will have a parasitic load of up to 0.4MWe. Therefore, the Facility will export approximately 1.1 MWe of electricity.

2.4 NO_X Abatement

A urea based SNCR system will be installed on the radiative section of the boiler.

The urea will be injected at a minimum of 2 levels, to achieve an optimum NOx reduction also at variable thermal load (and resulting variable flue gas temperatures), with an automated selection of injection location depending upon the actual temperature profile.

The excess of urea injected in the SNCR process will produce higher concentrations of gaseous ammonia. This acts as an additive, contributing to a further reduction of NOx concentrations in the catalytic filter element-based bag filter, based on SCR NOx reduction.

In addition, the Facility will utilise catalytic bag filters to provide additional NOx abatement.

There will be an additional SNCR reagent dosing system installed in the duct between the dry scrubber and the bag filters which will be able to deliver additional ammonia into the flue gas

stream to provide additional polishing of the flue gases to guarantee the BAT-AEL for NOx within the NOx abatement system. The dosing system will only be commissioned if, during commissioning of the flue gas treatment systems, it is identified that the SNCR system and the catalytic bag filters are not able to achieve the BAT-AEL for NOx.

2.5 Flue gas treatment systems

The facility will include a primary (dry, refer to section 2.5.1) and secondary (wet, refer to section 2.5.2) flue gas treatment system. This two-stage flue gas treatment system is designed to ensure that the flue gases are suitably cleaned prior to release to atmosphere and comply with the requirements of the Waste Incineration BREF.

The cleaned flue gas from the flue gas treatment systems will be monitored and discharged to atmosphere via a 36.5m stack.

2.5.1 Primary Flue Gas Treatment - Dry

After the energy recovery stage the flue gas passes through a secondary flue gas cooling section, where the temperature is controlled between 160°C and 200°C using ambient air as a cooling media, prior to treatment in the dry flue gas treatment system.

The dry flue gas treatment systems consist of:

- dry acid gas scrubbing system, which utilises hydrated lime as a reagent, to remove the majority of the acidic components in the flue gas; and
- PAC dosing to abate emissions of volatiles, including dioxins & furans, heavy metals and VOC's.
- A bag filter is used to remove fly ash from the flue gas stream, including the above reagents, thus eliminating dust emissions (PM, particulate matter) to the maximum extent. The Facility will include catalytic bag filters.

The hydrated lime dosing rate is controlled via the plant automation system, monitoring the actual dosing rate of additives (caustic) to the wet scrubber. Recirculation of lime will not be included due to the high acid content of the flue gases. Therefore, line will be dosed on a once though basis.

Hydrated lime and PAC will be injected into the flue gases upstream of the fabric filter in order to abate acidic gases, heavy metals and any remaining dioxins and furans. The hydrated lime will abate the emission of acidic components, including hydrogen fluoride, hydrogen chloride and sulphur dioxide.

The purpose of the PAC dosing system is to absorb any possible traces of dioxins and heavy metals in the flue gas. The storage tank is installed on load cells, to monitor dosing rates and actual storage tank level.

Following the injection of lime and PAC, the flue gas will then pass through the fabric filters, which will remove the particulates and reaction products, collectively known as Air Pollution Control residues (APCr). The APCr will be collected in special bags. The dosing rate for the acid gas reagent will be controlled by the upstream acid gas pollutant concentration measurements and proportioned to the volumetric flow rate of the flue gases. The bag filters will be catalytic bag filters, and will provide additional abatement of emissions of NOx and dioxins and furans.

2.5.2 Secondary Flue Gas Treatment - Wet

Following treatment of the flue gases within the dry flue gas treatment system, the flue gases will pass to the wet flue gas treatment system. The wet flue gas treatment system will be utilised to ensure compliance with the BAT-AELs for acid gases.

The wet flue gas treatment system consists of a two-stage wet scrubber utilising sodium hydroxide as the reagent. The secondary flue gas treatment system includes a bypass system. The bypass system will only be utilised when combusting wastes which have been identified as being classified as containing radioactive materials.

The secondary flue gas treatment systems consists of the following:

- a venturi type scrubber, with adjustable removal efficiency
- a column type scrubber, with integrated mist eliminator package

The sodium hydroxide dosing rate will be controlled via a pH measurement in the scrubber liquid circuit to optimise the abatement of the wet scrubber, whilst minimising the consumption of the reagent but optimum amount of additive.

The nominal outlet temperature of the flue gas leaving the wet scrubber will be in the range of 50 – 70°C, with the flue gas fully saturated with water vapour. Therefore, a flue gas reheat system, utilising steam, has been included within the design to increase the temperature of the flue gas to 130°C. This will mitigate the visible plume from the stack when treating the flue gas in the wet flue gas treatment system.

2.6 Emissions Monitoring and Stack

The treated flue gas will be monitored for pollutants and discharged to atmosphere via a dedicated 36.5m tall flue located adjacent to the building.

Emissions from the stack will be continuously monitored using a Continuous Emission Monitoring System (CEMS) for the following pollutants:

- Particulate matter (PM);
- sulphur dioxide (SO2);
- hydrogen chloride (HCl);
- carbon monoxide (CO);
- nitrogen oxides (NOx);
- hydrogen fluoride (HF);
- mercury (Hg); and
- VOC's, expressed as total organic carbon (TOC).

Flowrate, moisture and oxygen content will also be measured.

In addition, periodic monitoring will be undertaken of pollutants which are not able to be monitored continuously, such as the following:

- Group 3 heavy metals: antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni), vanadium (V);
- cadmium (Cd) and thallium (Tl);
- Benzo(a)pyrene (PaHs);
- dioxins and furans; and

- dioxin-like PCBs.

The Continuous Emission Monitoring (CEM) system will be MCERTS approved.

2.7 Ash Handling

The three main residues resulting from the process will be bottom ash, metals and APCr.

Bottom ash is collected in the ash chamber underneath the rotary kiln. Ash falls by gravity into an ash discharge screw conveyor underneath the ash chamber. Larger items that would otherwise damage the ash this discharge conveyor is automatically filtered out by a screen with 140mm diameter apertures and collected in a separate container inside the ash chamber. The remaining bottom ash is discharged automatically via a system with 4 number slide valves for automated and dust free discharge into the bottom ash skip. There will be regular collections of bottom ash for transfer off-site to a suitably licensed waste facility.

Metal is separated from the bottom ash discharge system using a permanent magnet in a dust tight drum separator.

APCr is collected in sealed Flexible Intermediate Bulk Containers (FIBCs or 'big-bags') following displacement from the bag filters and hoppers in the flue gas treatment process. The Big Bags will be stored in a transport container prior to transfer off-site to a suitably licenced waste management facility for disposal/recovery.

All ash handling activities are undertaken in enclosed buildings, with the ash maintained dry to prevent leachate from the ash.

2.8 Bin washing

The empty bins will be washed and disinfected, in accordance with EA guidance EPR 5.07, before being moved to a clean storage area ready for collection and reuse. The following 'appropriate measures' to be taken with regard to the cleaning of storage areas and containers:

- the use of a suitable surface material in storage areas to enable effective and regular cleaning and disinfection of surfaces;
- the checking of any re-useable mobile rigid containers (such as bins) and regular cleaning and disinfection of the containers once waste has been removed;
- the inspection of waste transport containers prior to each reuse to ensure their integrity, cleanliness and ability to meet the requirements for the Carriage of Dangerous Goods;
- demonstration that the cleaning and disinfection measures described above are capable of removing contamination and achieving disinfection across a broad spectrum of micro-organisms, and capable of either not producing or containing emissions of pathogens or chemical agents; and
- containment of wash waters within an impermeable area, with appropriate discharge to sewer or disposal off-site, with the prevention of run-off entering external areas or surface water drains.

For operational reasons, empty, unwashed bins may be transferred to a suitably permitted facility to be cleaned and disinfected.

2.9 Site Drainage

The Facility's existing site drainage arrangements are being retained, and surface wate run-off will be discharged into the existing surface water drainage systems.

Process effluents will be collected in a tank/sump to enable re-use within the Facility. Where process effluents cannot be re-used within the process they will be discharged to tankered offsite to a local wastewater treatment facility. Grundon is engaging with the Sewerage Undertaker to apply for a trade effluent consent for the discharge of process effluent to foul sewer.

Grundon understands that this is consistent with the existing arrangements for the site drainage systems, and do not constitute a Variation to the EP.

2.10 Ancillary Operations

A reverse osmosis water treatment plant will be installed, capable of treating the mains water to produce high quality water suitable for use as feed water for the boiler. Water treatment chemicals will be stored within a suitably contained storage area.

Water for fire-fighting will be sourced the mains water and a firewater tank, refer to the Fire Prevention Plan, Appendix F.

A standby diesel generator system will be present on-site to support safe shut down of the Facility in the event of an emergency shutdown.

3 Other Information for Application Form

3.1 Raw Materials

3.1.1 Types and Amounts of Raw Materials

The main (>1 tonnes) raw materials which will be stored at the Facility are presented in Table 2, with indicative values for their annual tonnages. Information on the potential environmental impact of these raw materials is included in Table 3.

Table 2: Types and amounts of raw materials and consumption rate at design load (for Schedule 1 Activities)

Schedule 1 Activity	Material	Maximum Storage Capacity	Estimated Annual Throughput [tonnes per annum]	Description
Section 5.1 Part A (1) (a)	Fuel oil	55 m^3 tank	60	Low sulphur oil
	Sodium Hydroxide solution	35 m^3 tank	1,100	30% sodium hydroxide solution
	Urea solution	35	800	40% urea solution
	Lime	90 m^3 soli	1,100	Calcium Hydroxide
	PAC	32.5 m^3 silo	170	Powdered activated carbon
	Ammonia solution for SCR	<2 m^3	140	28% ammonia solution
	Boiler treatment chemicals	<5 m^3	< 10	Oxygen scavenger, pH control, biocide, water treatment regeneration chemicals

Table 3: Raw materials and their effect on the environment

Environmental Medium								
Product	**Chemical Composition**	**Typical Quantity**	**Units**	**Air**	**Land**	**Water**	**Impact Potential**	**Comments**
Low sulphur oil	-	60	tonnes / year	0	100	0	Low impact	Fuel for the auxiliary burners during start-up and shutdown of the Facility.
Sodium hydroxide	NaOH	1,100	tonnes / year	0	0	100	Low impact	Sodium hydroxide is dosed into the scrubber to neutralise acid gases. The scrubber blowdown will be treated on-site and contained in a storage tank prior to transfer off-site to a suitable licensed disposal/recovery facility.
Urea solution (40 %)	$NH_3(aq)$	800	tonnes / year	100	0	0	Low impact	Reacts with nitrogen oxides to form nitrogen, carbon dioxide and water vapour. Any unreacted ammonia (a chemical intermediate) is released to atmosphere at low concentrations. Dosing will be controlled to minimise ammonia slip.
Hydrated lime	$Ca(OH)_2$	1,100	tonnes / year	0	100	0	Low impact	Lime is hydrated, injected and removed with the APC residues at the bag filter and disposed of as hazardous waste at a suitable licensed facility.
Activated Carbon	C	170	tonnes / year	0	100	0	Low impact	Injected PAC is removed with the APCr at the bag filter and disposed of as

Environmental Medium								
								hazardous waste at a suitable licensed facility.
Ammonia solution for SCR	NH_3	140	tonnes / year	100	0	0	Low impact	Reacts with nitrogen oxides to form nitrogen, carbon dioxide and water vapour. Any unreacted ammonia (a chemical intermediate) is released to atmosphere at low concentrations. Dosing will be controlled to minimise ammonia slip.
Boiler water treatment chemicals	Oxygen scavenger, pH control, biocide, water treatment chemicals	< 10	tonnes / year	0	0	100	Low impact	Oxygen scavenger, pH control, biocide, water treatment chemicals used in the water treatment plant to produce high quality boiler feedwater.

Various other materials, which will be used in small quantities (<5 tonnes per annum) will be required for the operation and maintenance of the Facility, including:

1. hydraulic oils and silicone-based oils;
2. isolation media within electrical switchgear;
3. refrigerant gases for the air conditioning plant;
4. glycol/antifreeze for cooling;
5. oxyacetylene, TIG, MIG welding gases;
6. CO_2 / firefighting foam agents; and
7. ignition, test and calibration gases.

These will be supplied to standard specifications offered by main suppliers. All chemicals will be handled in accordance with COSHH Regulations as part of the quality assurance procedures and full product data sheets will be available on-site.

Periodic reviews of all materials used will be made in the light of new products and developments. Any significant change of material, where it may have an impact on the environment, will not be made without firstly assessing the impact and seeking approval from the EA.

The Operator will maintain a detailed inventory of raw materials used on-site and have procedures for the regular review of new developments in raw materials.

3.1.2 Reagent Storage

All chemicals will be stored in an appropriate manner incorporating the use of suitable secondary and other measures (for example, acid and alkali resistant coatings) to ensure appropriate containment and tertiary abatement measures. This may include areas of hardstanding with kerbed containment, to prevent any potential spills from causing pollution of the ground/groundwater and/or surface water. The potential for accidents, and associated environmental impacts, is therefore limited.

All storage facilities for chemicals will be designed in accordance with recognised industry good practice to prevent pollution CIRIA Guidance titled '*Containment systems for the prevention of pollution*' (Ref: C736F), and the following EA guidance:

- prevent pollution if you're a business;
- report an environmental incident;
- store oil and any oil storage regulations;
- work on or near water and manage water on land.

Deliveries of all chemicals will be unloaded and transferred to suitable storage facilities. Areas and facilities for the storage of chemicals and liquid hazardous materials will be situated within secondary containment, such as bunds. Secondary containment facilities will have capacity to contain whichever is the greater of 110% of the tank capacity or 25% of the total volume of materials being stored, in case of failure of the storage systems.

Tanker off-loading of chemicals will take place within areas where the drainage is contained with the appropriate capacity to contain a spill during delivery. This may include measures such as areas of hardstanding with falls to a gully and/or sump.

A number of spill procedures will be in place for identified potential spillage events. This will include the provision of suitable equipment such as spill kits to deal with any incidents. Staff will receive

training in the use of such kits. Under all circumstances, priority will be given to the potential environmental and health impacts of spillages. Where appropriate, engineering controls will be employed to reduce the potential for or minimise the impact of spillages, such as bunded areas for above-ground fuel storage.

Any spillage that has the potential to cause environmental harm or to leave the Facility will be reported to the site management and recorded in accordance with installations inspection, audit and reporting procedures. The relevant regulatory authorities (Environment Agency / Health and Safety Executive) will be informed as specified as required in accordance with the Facility's documented management procedures should the spillage be significant.

In the event of a fire, contaminated water used for fighting fires will be contained through the use of an isolation valve to prevent discharge off-site. Additional storage will be available from site kerbing where appropriate.

3.1.3 Raw Materials and Reagents Selection

3.1.3.1 Acid gas abatement

There are several reagents available for acid gas abatement. Both sodium hydroxide (NaOH) or lime (CaO) can be used in a wet FGT system. Quicklime (CaO) can be used in a semi-dry FGT system. Sodium bicarbonate ($NaHCO_3$) or hydrated lime ($Ca(OH)_2$) can be used in a dry FGT process.

As explained in section 2.5.1 and 2.5.2, the acid gas abatements systems include for a primary and secondary abatement system. The primary acid gas abatements system consists of a dry scrubbing system using lime as the reagent, and the secondary abatement system utilises sodium hydroxide for polishing the flue gases

The reagents for semi-dry abatement have not been considered, since these abatement techniques have been discounted within the BAT assessment in Appendix E section 2.1. The two alternative reagents for a dry system – lime and sodium bicarbonate - have therefore been assessed further.

The level of abatement that can be achieved by both reagents is similar. However, the level of reagent used and therefore residue generation and disposal are different and requires a full assessment following the methodology in Horizontal Guidance Note H1 Whilst it is noted that this guidance has subsequently been withdrawn, the replacement guidance is not as prescriptive in the methodology required. Therefore, for the purposes of the BAT assessment, the requirements of the withdrawn guidance have been applied. The assessment is detailed in Appendix E and is summarised in Table 4.

Table 4: Acid gas abatement BAT data

Item	Unit	$NaHCO_3$	$Ca(OH)_2$
Mass of reagent required	kg/h	109.0	67.0
Mass of residue generated	kg/h	84.0	85.0
Cost of reagent	£/tonne	155	110
Cost of residue disposal	£/tonne	186	155
Overall Cost	£/op.hr/kmol	32.5	20.5
Ratio of costs		1.58	

Note: Data based on the abatement of one kmol of hydrogen chloride.

Whilst the use of sodium bicarbonate will lead to less residues than a lime-based system, this is significantly outweighed by the advantages of using lime as a reagent, which are as follows:

- Lime has higher removal rates of acid gases than sodium bicarbonate, which is reflected in the quantities of reagent consumed.
- Lime based APCr has a lower leaching rate than sodium bicarbonate based APCr. Therefore, there are greater waste management options available for lime based APCr. there are different options for the recovery of materials from lime based APCR, i.e. it can be recovered into substitute products displacing virgin materials. Veolia are aware that currently the only 'available' option for the management of sodium bicarbonate APCr is disposal in a landfill.
- The reaction temperature for lime systems matches well with the optimum adsorption temperature for carbon, which is dosed at the same time.
- The lime system has a slightly lower global warming potential due to the reaction chemistry.
- The costs per kmol of hydrogen chloride abated are almost 60% higher for a sodium bicarbonate system.

Taking all of the above into consideration, the use of lime is considered to represent BAT for the Facility.

3.1.3.2 NOx Abatement

NOx abatement systems can be operated with dry urea (prills), urea solution or aqueous ammonia solution. There are advantages and disadvantages with all options:

- urea is easier to handle than ammonia - the handling and storage of ammonia can introduce an additional risk;
- ammonia tends to give rise to lower nitrous oxide formation than urea;
- dry urea can be contained in 'big-bags', whereas ammonia solution is usually stored in silos and delivered in tankers; and
- ammonia emissions (or 'slip') can occur with both reagents, but good control will limit this.

The Environment Agency's sector guidance on waste incineration, titled "Incineration of waste (EPR5.01)", considers all options as suitable for NOx abatement. It is proposed to use urea solution for the SNCR system, because the climate change impacts of urea solution far outweigh the health and safety issued associated with the handling and storage of ammonia. Taking this into consideration the use of urea within the SNCR system is considered to represent BAT.

3.1.3.3 Auxiliary Fuel

As stated in Article 50 (3) of the Industrial Emissions Directive:

"The auxiliary burner shall not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil as defined in Article 2(2) of Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels (1) OJ L 121, 11.5.1999, p. 13., liquefied gas or natural gas."

Therefore, as identified by the requirements of IED the only available fuels that can be used for auxiliary firing are:

1. liquefied gas (LPG);
2. fuel oil; or
3. natural gas.

Auxiliary burner firing on a well-managed waste combustion plant is only required intermittently, i.e. during start-up, shutdown and when the temperature in the combustion chamber falls to 1,100°C.

LPG is a flammable mixture of hydrocarbon gases. It is a readily available product and can be used for auxiliary firing. As LPG turns gaseous under ambient temperature and pressure, it is required to be stored in purpose-built pressure vessels. If there was a fire within the site, there would be a significant explosion risk from the combustion of flammable gases stored under pressure. Considering the proximity of the site to other industrial facilities, LPG is not considered to be a suitable auxiliary fuel for the Facility due to the potential risk of explosion and associated off-site implications.

Natural gas can be used for auxiliary firing and is safer to handle than LPG. However, as stated previously, auxiliary firing will only be required intermittently. Auxiliary firing on natural gas requires large volumes of gas which would be needed to be supplied from a gas main within a reasonable distance from the Facility. Due to the costs associated with securing a sufficient gas supply for auxiliary firing purposes, and minimal consumption at all other times, the use of natural gas is not considered to represent BAT for the Facility.

There is an existing low sulphur fuel oil tank which is installed at the Facility. Whilst it is acknowledged that fuel oil is classed as flammable, it does not pose the same type of safety risks as those associated with the storage of LPG. The combustion of fuel oil will lead to some emissions of sulphur dioxide, but these emissions can be minimised as far as reasonably practicable through the use of low sulphur fuel oil.

Taking the above into consideration, fuel oil is considered to represent BAT for auxiliary firing at the Facility, and is already identified as an acceptable fuel within Table S2.1 of the EP.

3.2 Incoming Waste Management

3.2.1 Waste to be Processed at the Facility

The Facility is designed to process a wide range of clinical, hazardous and non-hazardous wastes which can be accepted in a range of packages, including wheeled bins, fibre board, plastic and steel drums, IBCs, boxes, bulk bags and gas cylinders. The full list of EWC codes to be processed in the Facility are listed in Appendix H.

Checks will be made on the paperwork accompanying each delivery to ensure that only waste for which the plant has been designed will be accepted. If the checks identify that the waste is unacceptable, a dedicated quarantine area will be available for the storage of unacceptable waste prior to transfer off-site.

The size of the waste storage area will allow for adequate storage of waste, to ensure continuous operation through weekends and holiday periods, when deliveries will be reduced. It also provides capacity for shutdown periods, during which waste may be stored for a number of weeks.

3.2.2 Waste Handling

3.2.2.1 Waste Acceptance and Pre-Acceptance Procedures

Grundon has existing documented procedures for pre-acceptance and acceptance of wastes which is has implemented at it's existing waste treatment facilities, refer to Appendix I.

Procedures will be implemented on site for the review of incoming wastes at the gatehouse and for checking incoming wastes against the agreed specifications on a regular basis.

Sampling of healthcare and hazardous wastes will be taken periodically and tested to verify conformity with the Facility's waste specifications, in accordance with EA Guidance titled, '*Healthcare waste: appropriate measures for permitted facilities'* and '*Sector Guidance Note S5.06: recovery and disposal of hazardous and non-hazardous waste'*.

3.2.2.2 Receiving Waste

In accordance with the Indicative BAT requirements of the following Environment Agency guidance

- Healthcare waste: appropriate measures for permitted facilities;
- Sector Guidance Note S5.01: Incineration of waste: additional guidance; and
- Sector Guidance Note S5.06: recovery and disposal of hazardous and non-hazardous waste;

the following measures will be implemented at the Facility:

- A high standard of housekeeping will be maintained in all areas and suitable equipment will be provided and maintained to clean up spilled materials.
- Vehicles will be loaded and unloaded in designated areas provided with impermeable hard standing. These areas will have appropriate falls to the process water drainage system.
- Fire-fighting measures will be designed by consultation with the Local Fire Officers, with particular attention paid to the waste reception and storage areas.
- Delivery and reception of waste will be controlled by a management system that will identify all risks associated with the reception of waste and shall comply with all legislative requirements, including statutory documentation.
- Incoming waste will be:
  - delivered in enclosed bins/vehicles;
  - unloaded under dedicated canopy on the northwest side of the HTI building; and
  - stored in enclosed, secure areas situated on areas of hardstanding with sealed drainage, with regular monitoring of storage areas undertaken to check for pests, litter, odour, leaks or spillages.
- Design of equipment, buildings and handling procedures will ensure there is insignificant dispersal of litter.
- Acceptance procedures will be employed to ensure that any wastes identified in their paperwork upon arrival which would prevent the thermal treatment process from operating in compliance with its permit are segregated and placed in a designated storage area pending removal.
- Waste with a higher risk of causing any odour, litter or pest problems, and the date of arrival/duration of storage of the waste, will be identified and prioritised.
- Chemical wastes will be stored in compliance with HSE guidance HSG71, ensuring compatibility is maintained within the storage bays.
- Refrigeration will be provided for wastes that are potentially reactive at elevated temperatures.
- Further inspection will take place by the plant operatives during bin tipping/waste unloading.
- Procedures and management systems for the delivery and reception of waste will be developed in accordance with Article 5 of the Waste Incineration Directive.
- In the event that waste is received at the Facility, but is not able to processed, it will be subsequently transferred to a suitably licenced waste management facility for processing.

3.2.3 Waste Minimisation (Minimising the Use of Raw Materials)

A number of specific techniques will be employed to minimise the generation of residues, focusing on the following:

1. Dioxin & Furan Reformation;
2. Furnace Conditions;
3. Flue Gas Treatment Control; and
4. Waste Management.

All of these techniques meet the Indicative BAT requirements from the Sector Guidance Note on Waste Incineration.

3.2.3.1 Dioxin & Furan Reformation

As identified within guidance note EPR5.01, there are a number of BAT design considerations required for the furnace. The furnace has been designed to minimise the formation of dioxins and furans as follows:

- Slow rates of combustion gas cooling would be avoided via boiler design to ensure the residence time would be minimised in the critical cooling section, to minimise the potential for de-novo formation of dioxins and furans.
- The gas residence time in the critical temperature range would be minimised by ensuring high gas velocities exist in these sections. The residence time and temperature profile of flue gas would be considered during the detailed design phase to ensure that dioxin formation would be minimised throughout the process.
- PAC will be injected to enhance the capture of dioxins as well as heavy metals.
- The boiler will be designed to ensure that the steam/metal heat transfer surface is a minimum temperature where the flue gas is in the de novo synthesis temperature range. It is Grundon's understanding that this temperature is typically around 170°C, subject to other reaction considerations.
- Computational Fluidised Dynamics (CFD) will be applied to the design, where considered appropriate, to ensure gas velocities are in a range that negates the formation of stagnant pockets / low velocities.
- Minimising the volume in the critical cooling sections will ensure high gas velocities.
- Boundary layers of slow-moving gas along boiler surfaces would be prevented via design and a regular maintenance schedule to remove build-up of any deposits that may have occurred.

3.2.3.2 Furnace Conditions

A speed controlled induced draft fan is used to draw the flue gas through the incineration process. The speed of the ID fan is controlled in such a way that the pressure in the primary combustion rotary kiln is maintained at an accurate negative pressure relative to atmosphere, preventing any flue gas discharge from the overall combustion process.

The stationary zone links the solid waste feed system to the rotary kiln and serves as a flue gas connection between the kiln and the post combustion chamber. In the stationary zone, two processes take place:

- Drying and pyrolysis of the solid waste introduced via the guillotine door. As the primary combustion air and the combustion gas flows through the kiln in counter current to the waste stream, the primary air is heated by the exiting ash and achieves its maximum temperature -

and minimum oxygen concentration - at the inlet side of the rotating kiln and stationary zone, i.e. at the point where the waste is introduced.

- First phase of post combustion. The stationary part of the kiln is a critical component regarding maintenance and operational reliability, due to the combination of high flue gas temperatures, cold and possibly moist waste supply and moving action of the ram feeder and rotary kiln. Specific design measures are taken here to improve system reliability.

The combustible gases produced by the pyrolysis and partial combustion of the waste in the primary combustion chamber will be mixed with secondary air introduced at the front of the kiln and burn out completely in the post combustion chambers. The temperature of the flue gases will be in the range of 1100°C to 1200°C, for a minimum 2-seconds residence time. As the flue gases exit the stationary zone of the primary combustion, high calorific liquid and gases wastes will be injected into the flue gas stream as it exits the stationary zone of the primary combustion to further raise the flue gas temperature before it passes the secondary combustion section.

Furnace conditions will be optimised in order to minimise the quantity of residues arising for further disposal. Burnout in the furnace will either reduce the Total Organic Carbon (TOC) content of the bottom ash to less than 3%, or Loss on Ignition (LOI) of the bottom ash to less than 5%, by optimising waste feed rate and combustion air flows.

3.2.3.3 Flue Gas Treatment Control – Acid Gases

Close control of the flue gas treatment system will minimise the use of reagents and hence minimise the APCr produced.

Lime usage within the primary acid gas scrubbing system will be minimised by trimming reagent dosing to accurately match the acid load using fast response upstream acid gas monitoring. The plant preventative maintenance regime will include regular checks and calibration of the reagent dosing system to ensure optimum operation. Back-up feed systems will be provided to ensure no interruption in the lime dosing system. The bag filter is designed to build up a filter cake of unreacted acid gas reagent, which acts as a buffer during any minor interruptions in dosing.

Due to the nature of the waste which will be processed at the Facility, the secondary wet acid gas scrubbing system is required to polish the flue gases to ensure compliance with the BAT-AELs for all acid gases.

3.2.3.4 Flue Gas Treatment Control – NOx

The SNCR system will require the injection of a SNCR reagent (urea solution) into the duct between the secondary combustion chamber and the boiler via a number of nozzles. The location of the nozzles will be determined using CFD modelling. The optimal adjustment of the SNCR reagent injection and steady operation of the combustion process are crucial for maximising NOx reduction through the SNCR system. These will be ensured by the following measures.

- integrated combustion control system including an automatic adjustment to the quality of the waste incinerated; and
- consistent oxygen and temperature profiles in the secondary combustion chamber by means of the swirl created by secondary air injection.

Following commissioning of the Facility it is proposed to submit to the EA a report which describes the performance and optimisation of the SNCR system and combustion settings to minimise oxides of nitrogen (NOx) emissions within the emission limit values described in this permit with the minimisation of nitrous oxide emissions. It is proposed that the report includes an assessment of the level of NOx and N_2O emissions that can be achieved under optimum operating conditions.

In addition to the SNCR system, the bag filters are catalytic bag filters. The bag filters will provide additional polishing of NOx emissions prior to release to atmosphere.

3.2.3.5 Waste Management

The arrangements for the management of residues produced by the Facility are presented in section 3.9. In particular, bottom ash and APCr from the flue gas treatment system will be stored and disposed of separately.

The procedures for handling of the wastes generated by the facility will be in accordance with the Indicative BAT requirements in the Sector Guidance Note, refer to section 3.2.2.

3.2.3.6 Waste Charging

The Facility will comply with the indicative BAT requirements for fuel charging outlined in the Waste Incineration Sector Guidance Note; the Waste Incineration BREF and the specific requirements of the IED:

- The combustion control and feeding system will be fully in line with the requirements of the IED. The conditions within the furnace will be continually monitored to ensure that optimal conditions are maintained and that the emission limits are complied with. Auxiliary burners fired with gas oil will be installed and will be used to maintain the temperature in the combustion chamber;
- The waste charging and feeding systems will be interlocked with furnace conditions so that charging cannot take place when the temperatures drop below 1,100°C, both during start-up and if the temperature falls below 1,100°C during operation, or if air flows are inadequate;
- The Facility will be designed to ensure a residence time of 2 seconds at 1,100°C for gases in the secondary combustion chamber;
- It is anticipated that oxygen levels would be maintained at approximately 6% volume at the final combustion stage to ensure the destruction of organic species - this will be confirmed during detailed design and commissioning of the combustion process;
- The waste charging and feeding systems will also be interlocked with the continuous emissions monitoring system to prevent waste charging if the emissions to atmosphere are in excess of an emission limit value;
- Following the feed of waste onto the waste feed system the waste is moved mechanically by means of rams from the feed end, to push the waste into the rotary kiln;
- The backward flow of combustion gases and the premature ignition of waste will be prevented by ensuring that the furnace is maintained under negative pressure;
- Between the lift charging door and the primary chamber of the kiln is a refractory lined tunnel which prevents any waste being drawn up into the loader hopper; and
- In a breakdown scenario, operations will be reduced or closed down as soon as practicable until normal operations can be restored.

The waste feed rate to the furnace will be controlled by the combustion control system. If there is an intermediate waste feed-stop, requiring the auxiliary burners to operate to maintain the operation of the Facility without entering shutdown, the flue gas treatment systems will remain in operation.

3.3 Water Use

Under normal operation, the Facility will consume approximately 5 m^3/hr. The principal consumers of water are:

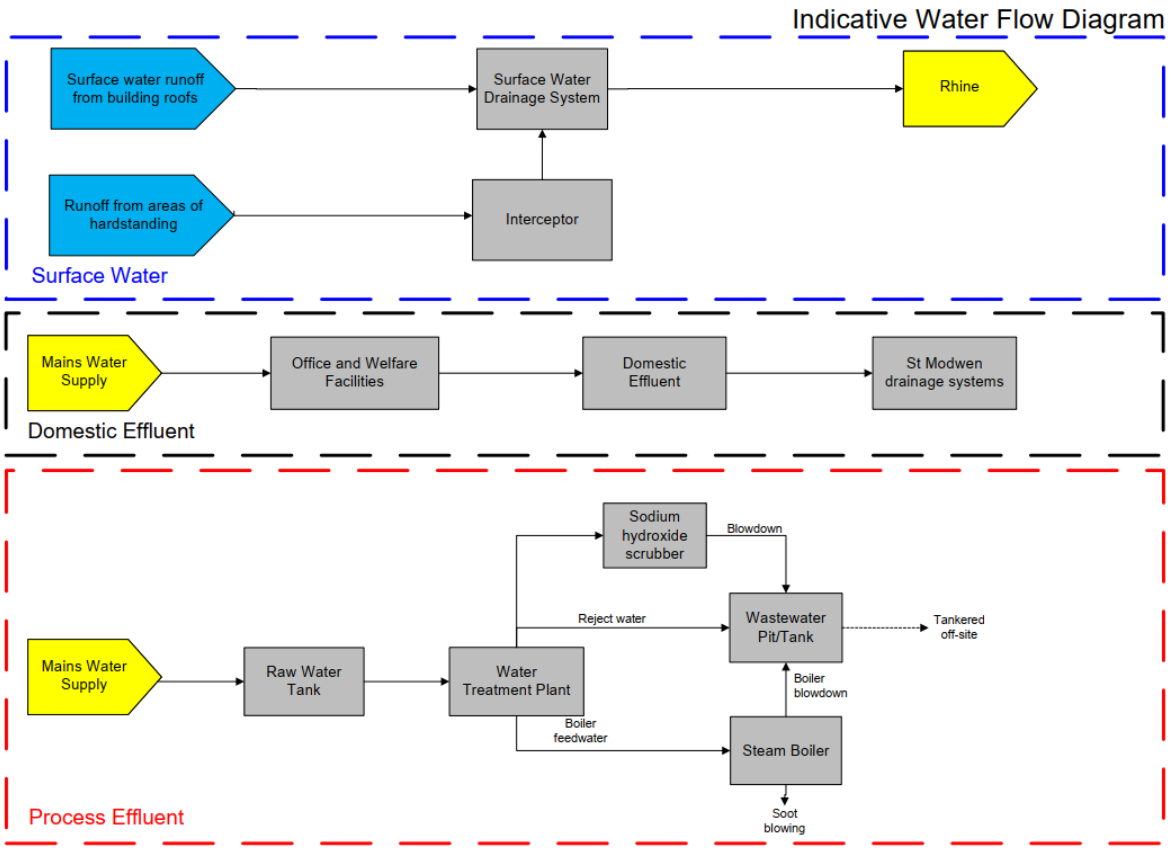
- the wet scrubber (4.6 m3/hr); and
- the water treatment plant to provide boiler feedwater (0.3 m3/hr).

Other water consuming processes include the SNCR system. The following key points should be noted:

- Most of the steam sent to the steam turbine will be recycled as condensate. The remainder will be lost as blow-down to prevent build-up of sludge and chemicals, through soot blowing and the FGT system. Therefore, under normal operation, boiler feedwater will be supplied as high-quality condensate from the air cooled condenser plant. Lost condensate will be replaced with high quality treated water - the HTI will include a dedicated water treatment plant to supply high quality boiler feedwater.
- Under 'normal operations', there will not be any discharges of process emissions to water from the Facility.
- Where practicable, waste waters generated from the process would be reused/recycled within the process.
- In the event there are excess process effluents generated, such as during periods of maintenance, these will be discharged to sewer, in accordance with a Trade Effluent Consent which will be secured from the sewerage undertaker (Bristol Water).
- Surface water runoff from within the site, buildings, parking and other areas of hardstanding areas will collected in the existing surface water drainage systems.
- Foul water from domestic sources will be discharged to sewer, subject to formal approval from Bristol Water.
- The water system has been designed with two key objectives:
  - minimal process water discharge; and
  - minimal consumption of potable water.
- Firewater will be provided by a firewater tank which is shared with the adjacent waste transfer building - this will be confirmed during detailed design of the Facility.
- The Facility will have separate process water, foul sewer and surface/storm water systems.

An indicative water flow diagram for the Facility is presented in Figure 2. A larger version of this drawing is included within Appendix A.

Figure 2: Indicative Water Flow Diagram



3.3.1 Potable and Amenity Water

The incoming mains water supply will be separated into industrial water, fire-fighting water and potable water.

The potable water supply will provide water for drinking supplies for the offices and canteen facilities. The quantity of this water is expected to be small compared to the other water uses on site.

Wastewater from domestic uses, such as showers, toilets, and mess facilities, will be discharged into the foul sewer system.

3.3.2 Process Water

Industrial and fire-fighting water supplies will be boosted on-site to ensure adequate pressure is maintained in the systems.

Process waters will be supplied by mains water. Mains water will be supplied by Bristol Water, with a proportion being treated in the on-site water treatment plant to provide high-quality boiler feedwater and the remainder being consumed by the wet scrubber.

Washdown water consumption will be minimised by the use of trigger controls on all wash hoses.

3.4 Emissions

3.4.1 Point Source Emissions to Air

The cleaned flue gas from the Facility will be monitored for pollutants and discharged to atmosphere via a 36.5m stack.

The source of point source emissions to air from the Facility are presented in the table below:

Table 5: Proposed emission points

Emission Point Reference	Source
A1	HTI Stack
A2	Emergency diesel generator

The full list of proposed emission limits for atmospheric emissions is shown in Table 6, and where applicable is in accordance with the upper range of the BAT-AELs for a 'new plant' stated in the Waste Incineration BREF.

Table 6: Proposed emission limit values (ELVs)

Parameter	Units	Half Hour Average	10-minute average	Daily Average	Periodic Limit
Emission Point A1					
Particulate matter	mg/Nm^3	30		5	
VOCs as Total Organic Carbon (TOC)	mg/Nm^3	20		10	
Hydrogen chloride	mg/Nm^3	60		6	
Carbon monoxide	mg/Nm^3		150	50	
Sulphur dioxide	mg/Nm^3	90		30	
Oxides of nitrogen (NO and NO_2 expressed as NO_2)	mg/Nm^3	200		120	
Ammonia				10	
Hydrogen fluoride	mg/Nm^3				1
Cadmium & thallium and their compounds (total)	mg/Nm^3				0.02
Mercury and its compounds	mg/Nm^3				0.02
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	mg/Nm^3				0.3
Benzo(a)pyrene (PaHs)	µg/Nm^3				0.04
Dioxins & furans	ng I-TEQ/ Nm^3				0.04
Dioxins & furans and dioxin-like PCBs	ng WHO-TEQ/Nm^3				0.06
All expressed at 11% oxygen in dry flue gas at standard temperature and pressure.					

Parameter	Units	Half Hour Average	10-minute average	Daily Average	Periodic Limit
Averaging period for carbon monoxide is 95% of all 10-minute averages in any 24-hour period.					

3.4.2 Fugitive Emissions to Air

In addition to the point source emissions to air, there will be potential fugitive emissions to air from refilling of raw material storage facilities, such as tanks, bags and silos. Where appropriate, these will be vented to the tanker during any tank refilling.

The lime silo will be filled by bulk tanker and offloaded pneumatically, with displaced air vented to the atmosphere through a fabric filter located on top of the silo. Any filter residues will be returned to the silo. Cleaning of the filter will be done automatically with compressed air after filling, with the filter regularly inspected for leaks.

PAC will be delivered by road in bags/tanker and stored in a designated storage area/silo.

All waste handling activities will be undertaken within enclosed buildings or under the canopy, and therefore will minimise fugitive emissions of dust from the Facility. All waste will be delivered to the Facility in waste containers/receptacles and/or enclosed waste delivery vehicles.

3.4.2.1 Waste Handling and Storage

Waste reception and handling will be undertaken in a covered waste reception area and within enclosed storage areas, which will prevent the release of litter and dusts. A summary of the waste storage and handling arrangements are provided in section 2.1.2.

Suitable procedures, equipment and disinfectants will be in place to deal with any spillages that may occur, with staff made aware of the location of equipment/disinfectants and trained in their use.

Primary combustion air will be drawn from the waste storage area to maintain negative pressure in the building and fed into the primary combustion chamber.

Regular cleaning and good housekeeping of the waste reception and storage areas minimise the potential for the release of any litter and dusts.

3.4.2.2 Silos

All silos (lime and PAC) containing solid or powdered materials will be fitted with bag filter protection to prevent the uncontrolled release to dusts during refilling. Maintenance procedures will be developed for routine inspection and testing of the bag filters.

3.4.3 Point Source Emissions to Water

This is not expected to change from the currently permitted arrangements. There will be no emissions of process effluent from the Facility discharged to water under normal operation. Surface water run-off from building roofs and areas of hardstanding will be collected in the existing surface water drainage system, prior to discharge.

3.4.4 Point Source Emissions to Sewer

Under 'normal operation', there will not be any discharges of process effluent from the Facility. Where practicable, process effluents from boiler blowdown and other processes will be re-used within the Facility.

Under normal operating conditions, wastewater will be generated from the following processes:

- reject water from the water treatment plant;
- process effluent (e.g. boiler blowdown);
- blowdown from the wet scrubber;
- effluent generated through washing and maintenance procedures.

Waste waters from surplus boiler water and water treatment plant effluent will be recycled where possible. Process effluent will either be discharged to sewer, or will be collected in a tank/sump for transfer off-site to a suitably licenced waste management facility.

Domestic effluents will be discharged to sewer, as per the existing arrangements for the Facility.

3.4.5 Contaminated effluents

The blowdown from the wet scrubber will be required to comply with the BAT-AELs for 'indirect emissions to water' stated in the Waste Incineration BREF as shown in Table 7.

Table 7: Proposed ELVs for the blowdown

Parameter	Units	Emission limit for blowdown
Suspended solids	mg/l	45
Mercury and its compounds	mg/l	0.01
Cadmium and its compounds	mg/l	0.03
Thallium and its compounds	mg/l	0.03
Arsenic and its compounds	mg/l	0.05
Lead and its compounds	mg/l	0.06
Chromium and its compounds	mg/l	0.1
Copper and its compounds	mg/l	0.15
Nickel and its compounds	mg/l	0.15
Zinc and its compounds	mg/l	0.5
Antimony	mg/l	0.9
Dioxins and furans	ng/l	0.05

Periodic monitoring of the blowdown will be undertaken to demonstrate compliance with the emission limits will be undertaken prior to the blowdown being collected in the process effluent tank/sump.

3.4.6 Noise

A noise assessment for the Facility is presented in Appendix B. General measures for noise management within the Facility are detailed below.

Most noisy plant items will be installed within the main building rather than outside and equipped with noise insulation if necessary. The air-cooled condensers have been designed to reduce noise and tonal components and have been located to the east of the site in order to minimise noise impact on permanent local receptors. A sound attenuator will be fitted to the exhaust of the flue gas ID fan. Waste vehicle movements at night will be reduced and regular maintenance of plant items will ensure noise does not become a problem.

Mobile plant will comply with the most up-to-date standards, including noise emissions. All mobile plant will be operated and maintained in accordance with the manufacturer's instructions.

Noise level checks will be carried out on a regular basis in operational areas of the Facility where high noise levels may be present. Early warning of increasing noise levels will result in the implementation of a noise management plan, which will investigate opportunities to reduce/mitigate noise impacts from the Facility.

3.4.7 Odour

The storage and handling of incoming waste has a limited potential to give rise to odour. The facility will be designed in accordance with the requirements of Environment Agency Guidance Note H4: Odour, and hence will include controls to minimise odour during normal and abnormal operation. Waste will be managed in a manner to ensure that problems with odour, litter and pests do not occur.

Waste will be stored in secure, closed containers, prior to loading onto the feeder and being transferred to the furnace. This minimises the potential for any release of dusts, litter or odour. Primary air for the combustion process is taken from within the main building, creating negative pressure and minimising emissions of odour from the Facility.

3.5 Monitoring Methods

3.5.1 Emissions Monitoring

Sampling and analysis of all regulated pollutants will be carried out to CEN or equivalent standards (e.g. ISO, national, or international standards). This ensures the provision of data of an equivalent scientific quality.

The Facility will be equipped with modern monitoring and data logging devices to enable checks to be made of process efficiency.

The purpose of monitoring has three main objectives:

- To provide the information necessary for efficient and safe plant operation;
- To warn the operator if any emissions deviate from predefined ranges; and
- To provide records of emissions and events for the purposes of demonstrating regulatory compliance.

3.5.1.1 Monitoring Emissions to Air

The cleaned flue gases will be monitored for pollutants and discharged to atmosphere via the stack.

The following parameters for the emissions from the Facility will be monitored and recorded continuously using a Continuous Emissions Monitoring System (CEMS):

- Carbon monoxide;

- Hydrogen chloride;
- Sulphur dioxide;
- Nitrogen oxides;
- Ammonia;
- Volatile organic compounds (VOCs); and
- Particulates.

In addition, the oxygen content, water vapour content, temperature, flow rate and pressure of the flue gases will be monitored so that the emission concentrations can be reported at the reference conditions required by the Industrial Emissions Directive (IED).

Once operational, in addition to the CEMS system, emissions to air from the Facility will be subject to periodic surveillance tests by independent testing company's at frequencies to be agreed with the EA.

In addition to the CEMS system, the following emissions from the Facility will also be monitored by means of periodic spot sampling at frequencies agreed with the Environment Agency:

- Group 3 Heavy Metals [antimony (Sb), arsenic (As), lead (Pb); Chromium (Cr), Cobalt (Co), Copper (Cu), Manganese (Mn), Nickel (Ni), Vanadium (V)];
- Cadmium (Cd) and thallium (Tl);
- Mercury (Hg);
- Hydrogen fluoride;
- Benzo(a)pyrene (PaHs);
- Dioxins and furans; and
- Dioxin like PCBs.

The methods and standards used for emissions monitoring will be in compliance with guidance note EPR5.01 and the IED. In particular, the CEMS equipment will be certified to the MCERTS standard.

Sampling and analysis of all pollutants including dioxins and furans will be carried out to CEN or equivalent standards (e.g. ISO, national, or international standards). This ensures the provision of data of an equivalent scientific quality.

The frequency of periodic measurements will comply with the emission limits within the EP as a minimum. The flue gas sampling techniques and the sampling platform will comply with Environment Agency Technical Guidance Notes M1 and M2.

All monitoring results shall be recorded, processed and presented in such a way as to enable the EA to verify compliance with the operating conditions and the regulatory emission limit values within the EP.

Periodic monitoring will be undertaken by MCERTS accredited stack monitoring organisations.

Reliability

IED Annex VI Part 8 allows a valid daily average to be obtained only if no more than 5 half-hourly averages during the day are discarded due to malfunction or maintenance of the continuous measurement system. IED Annex VI Part 8 also requires that no more than 10 daily averages are discarded per year.

These reliability requirements will be met primarily by selecting MCERTS certified equipment.

Calibration of the CEMS will be carried out at regular intervals as recommended by the manufacturer and by the requirements of BS EN14181 and the BS EN 15267-3. Regular servicing

and maintenance will be carried out under a service contract with the equipment supplier. The CEMs will be supplied with remote access to allow service engineers to provide remote diagnostics.

Should a problem with the CEMS occur, the plant would shut down until the relevant maintenance and repairs have been carried out.

Start-up and shut-down

In accordance with the Environment Agency's draft Guidance for '*Deriving start-up and shut-down definitions for waste incinerators and co-incinerators*', the start-up and shutdown conditions have been defined. The pre-start-up conditions and start-up complete conditions are presented within Table 8 and Table 9; and the commencement of shutdown and shutdown complete conditions are presented within Table 10 and Table 11.

Table 8: Pre-start-up and beginning of start-up

	Criteria
Before the support burners can be lit, the adjacent criteria must be met:	• CEMS are operational • System check performed; starting position of equipment is checked, if needed adjusted and acknowledged • If feedback on all items is according to preconditions set auto start-up is carried out; equipment is started in pre-programmed sequence. Feedback is given via electronic 'mimic board' to advise on status. As one of the items in this sequence ID fan to reach and control a preset pressure, primary and secondary burners are started
Before waste feed begins, the adjacent criteria must be met:	• Dry scrubber system is in operation and bag filters have been coated with a sufficient quantity of lime and active carbon • Wet scrubber system is in operation including scrubber water ancillaries e.g., pH correction etc. • Support burners have been lit and the ID fan and air supply fans are in operation
Waste feed begins when:	• All of the above criteria have been met • Secondary combustion chamber operating temperature is minimum 1100°C

Table 9: Start-up sequencing is complete – normal operation commences

	Criteria
	All earlier criteria mentioned under start up etc. are still met

	Criteria
Start-up finishes and normal operating conditions commence when all of the following are true: **Once normal operating conditions have commenced, permit ELVs apply**	• Secondary combustion chamber temperature is above 1100°C • Start-up burners are in operation to prevent decrease of combustion temperatures below the values described. Gradual reduction to in burner operation over 60mins at which point they are turned off • Pressure in post combustor is maintained to ensure sufficient oxygen needed for the incineration process • Oxygen content is < 15%

Table 10: Beginning of shutdown - – normal operation ends

	Criteria
Normal operating conditions cease and shut-down begins when all of the adjacent criteria are true: **Once normal operating conditions have ceased, permit ELVs no longer apply**	• Waste feed has ceased • Shutdown sequence initiated (an automatic pre-programmed sequence is activated from the control room) • Burners operational • Oxygen content > 15% • 90 mins have elapsed since waste feed ceased

Table 11: End of shutdown

	Criteria
Shut-down ends when:	Preprogrammed sequence has ended, this sequence is as follows: • All waste within the primary and secondary combustion chambers has been burnt out • Burners are switched off • When preset primary temperature reaches 200 degrees, auto shutdown of the remaining process is triggered; among other systems wet and dry scrubbing systems and ID fan stops

3.5.1.2 Monitoring Emissions to Water and Sewer

There will be a sampling point to enable process effluent discharged from the Facility to be sampled prior to discharge. This will enable the effluent to be sampled to demonstrate compliance with any

requirements stated in the Trade Effluent Consent obtained from Bristol Water, should one be issued.

3.5.2 Monitoring of Process Variables

The Facility will be controlled from a dedicated Control Room. A modern control system, incorporating the latest advances in control and instrumentation technology, will be utilised to control operations, optimising the process relative to efficient heat release, good burn-out and minimum particle carry-over. The system will control and/or monitor the main features of the plant operation including, but not limited to the following:

- Combustion air;
- Fuel feed rate;
- SNCR system;
- Flue gas oxygen concentration at the boiler exit;
- Flue gas composition at the stack;
- Combustion process;
- Boiler feed pumps and feedwater control;
- Steam flow at the boiler outlet;
- Steam outlet temperature and pressure;
- Boiler drum level control; and
- Flue gas control.

The response times for instrumentation and control devices will be designed to be fast enough to ensure efficient control.

The following process variables have particular potential to influence emissions:

- Fuel throughput will be recorded to enable comparison with the design throughput. As a minimum, daily and annual throughput will be recorded;
- Combustion temperature will be monitored at a suitable position to demonstrate compliance with the requirement for a temperature of at least 1,100°C;
- The differential pressure across the bag filters will be measured, in order to optimise the performance of the cleaning system and to detect bag failures; and
- The concentration of hydrogen chloride in the flue gases upstream of the flue gas treatment system will be measured in order to optimise the performance of the emissions abatement equipment.

Water use will be monitored and recorded regularly at various points throughout the process to help highlight any abnormal usage. This will be achieved by monitoring the incoming water supplies and the boiler water makeup.

In addition, electricity and auxiliary fuel consumption will be monitored to highlight any abnormal usage.

3.5.2.1 Validation of Combustion Conditions

The Facility will be designed to ensure a residence time of 2 seconds at 1,100°C for gases in the in the secondary combustion chamber. This criterion will be demonstrated using Computational Fluid Dynamic (CFD) modelling during the design stage and confirmed by the recognized measurements and methodologies during commissioning in accordance with EPR5.01 and WRc guidance Note,

titled '*Review of BAT for New Waste Incineration Issues: Part 2 Validation of Combustion Conditions*'.

It will also be demonstrated during commissioning that the Facility can achieve complete combustion by measuring concentrations of carbon monoxide, VOCs and dioxins in the flue gases and TOC of the bottom ash.

During the operational phase, the temperature at the 2-seconds residence time point will be monitored to ensure that it remains at 1,100°C. The location of the temperature probes will be selected using the results of the CFD model. If it is not possible to locate the temperature probes at precisely the 2-seconds residence time point, then a correction factor will be applied to the measured temperature.

3.5.2.2 Measuring Oxygen Levels

The oxygen concentration at the boiler exit of the Facility will be monitored and controlled to ensure that there will always be adequate oxygen for complete combustion of combustible gases. Oxygen concentration will be controlled by regulating the combustion airflows and the waste feed rate.

3.6 Technology Selection (BAT)

Within this section, qualitative and quantitative BAT assessments have been presented for the following:

- combustion technology;
- NOx abatement technology;
- acid gas abatement technology;
- particulate matter; and
- steam condenser.

Where appropriate, the quantitative assessments draw on information and data obtained by Fichtner from a range of different projects using the technologies which have been identified as potentially representing BAT from an initial qualitative assessment.

3.6.1 Combustion Technology

It is proposed that the waste treatment/energy recovery technology for the Facility will be a rotary kiln. This is an accepted and commonly used technology in the UK and Europe for the incineration of hazardous waste, including the waste types to be treated by the Facility.

The Waste Incineration BREF, the BREF for Large Combustion Plants and EPR guidance note EPR 5.01 identify a number of alternative technologies for the combustion of waste fuels. The suitability of these technologies has been considered including different waste incineration technologies, as follows:

1. **Grate furnaces**

   As stated in the Sector Guidance Note, these are designed to handle large volumes of waste.

   Grates are the leading technology in the UK and Europe for the combustion of non-hazardous waste. A moving grate comprises an inclined fixed and moving bars (or rollers) or a vibrating grate that will move the fuel from the feed inlet to the residue discharge. The grate movement

turns and mixes the fuel along the surface of the grate to ensure that all waste is exposed to the combustion process.

Grate systems are primarily designed for large quantities of heterogeneous waste. However, the waste to be processed at the Facility will be small quantities of hazardous waste. Although this technology could potentially be used, at this stage a grate system has not been considered as an option for combustion of waste at the Facility.

2. **Fixed hearth**

   These systems are best suited to low volumes of consistent waste. However, the waste to be processed at the Facility will vary in nature and is not likely to be consistent. Therefore, these systems are not considered suitable for the proposed design capacity and have not been considered any further.

3. **Pulsed hearth**

   Pulsed hearth technology has been used in the past for the combustion of waste. However, there have been difficulties in achieving reliable and effective burnout of the waste and it is considered that the burnout criteria required by Article 50 (1) of the IED would be difficult to achieve. Therefore, these systems are not considered practical and have not been considered any further.

4. **Stepped hearth**

   Stepped hearth technology is commonly used in clinical waste incinerators. EPR 5.01 describes the need for provision of good secondary combustion and residence time in stepped hearth incinerators. The Facility will employ monitoring of process variables and measures to validate combustion conditions (refer to section 3.5.2.1) and will ensure a residence time of 2 seconds at 1,100°C for gases in the in the secondary combustion chamber. Due to the proven nature of stepped hearth incinerators in treating clinical waste, this technology is considered to be the most suitable for the Facility, and is considered in the qualitative BAT assessment presented in Appendix E.

5. **Rotary and oscillating kilns**

   Rotary kilns are used widely within the cement industry which uses a consistent fuel feedstock and they have been used within the waste incineration sector for the treatment of clinical and hazardous wastes. They are suited for the combustion of wastes with variable moisture contents and variable calorific values, such as the wastes proposed to be processed at the Facility.

   The energy conversion efficiency of a rotary kiln is lower than that of other thermal treatment technologies due to the large areas of refractory lined combustion chamber. Rotary kilns have been considered further as a combustion technology in the qualitative BAT assessment presented in Appendix E.

6. **Fluidised bed combustor**

   Fluidised beds are designed for the combustion of relatively homogeneous fuel. They are sensitive to inconsistencies within a fuel. Therefore, fluidised beds are appropriate for untreated waste which has been pre-processed to produce an RDF, and so are not appropriate for the mix of wastes proposed for the Facility.

   While fluidised bed combustion can lead to slightly lower NOx generation, the injection of a NOx reagent is still required to achieve the relevant BAT-AEL's.

   Fluidised beds can have elevated emissions of nitrous oxide, a potent greenhouse gas. Some have been designed to minimise the formation of nitrous oxide.

7. **Pyrolysis/Gasification**

   In pyrolysis, the waste is heated in the absence of air, leading to the production of a syngas with a higher calorific value than from gasification. However, the process normally requires some form of external heat source, which may be from the combustion of part of the syngas.

   For gasification installations, pre-treatment would likely be required for heterogeneous wastes. The gases produced may be corrosive and toxic due to the presence of partially reduced species.

   Various suppliers are developing pyrolysis and gasification systems for the incineration of waste, however, systems such as these are not considered to be a robust and proven technology. Therefore, these systems have not been considered any further.

A qualitative BAT assessment for a stepped hearth and a rotary kiln has been undertaken and is presented in Appendix E.As concluded in the BAT assessment

- Stepped hearth systems are suitable for the incineration of low volumes of clinical waste, particularly when residence time is controlled to achieve good waste burnout. However, the various complex moving parts may introduce a higher potential for mechanical failure.
- Rotary kilns enable the highest degree of flexibility, in terms of permitted waste types, and are better suited to processing the wastes types which will be processed at the Facility compared to stepped hearths. However, there can be difficulties with controlling primary air, the potential for slagging, higher PM emissions and the requirement for pre-treatment of waste. However, the technology provider for the Facility has extensive experience of designing plants to address these difficulties, and has mitigated against them within its design.

Taking the above into consideration, a rotary kiln system is considered to represent BAT for the incineration of waste at the Facility.

3.6.2 NOx Abatement Systems

As stated within the relevant Environment Agency guidance document for Waste Incineration (EPR5.01), there are three recognised technologies available for the abatement of emissions of NOx:

- Flue Gas Recirculation (FGR);
- Selective Non-Catalytic Reduction (SNCR); and
- Selective Catalytic Reduction (SCR).

1. **Flue gas recirculation (FGR)**

   The recirculation of a proportion of the flue gases into the combustion chamber to replace some of the secondary air changes the operation of the plant in various ways, by changing the temperature balance and increasing turbulence. This requires the boiler to be designed with a larger heat capacity to ensure that the air distribution remains even.

   Some suppliers of combustion technologies have designed their combustion systems to operate with FGR and these suppliers can gain benefits of reduced NOx generation from the use of FGR. Other suppliers have focussed on reducing NOx generation through the control of primary and secondary air and the technology design, and these suppliers gain little if any benefit from the use of FGR. The technology provider has not integrated FGR into the design of the boiler. Therefore, it has not been considered within this application.

   It is important to emphasise that, even where FGR does improve the performance of a combustion system, it often does not reduce NOx emissions to the levels required by IED. Therefore, it likely would not alleviate the need for further NOx abatement systems.

2. **Selective non-catalytic reduction**

   SNCR involves distributing a spray containing an aqueous ammonia or aqueous urea solution (the de-NOx reagent) into the flue gas flow path at an appropriate location (typically the secondary combustion chamber), at a gas temperature of approximately 1,100°C. The reagent reacts with the NOx formed in the combustion process to produce a combination of nitrogen, water and carbon dioxide (when urea is used as the reagent). NOx levels are primarily controlled by monitoring the combustion air.

   Extensive dosing of reagent or low reaction temperatures can lead to ammonia slip, resulting in the formation of ammonia salts downstream in the flue gas path and discharge to atmosphere of unreacted ammonia. Ammonia may be controlled under the plant's permit and can lead to secondary problems, so should be kept to a minimum. This can be addressed by employing systems to control the rate of reagent dosing.

   SNCR is widely deployed across waste incineration plants in the UK and Europe. It is proposed to use SNCR for the Facility to control NOx levels, alongside the monitoring of combustion air. Ammonia solution will be used as the SNCR reagent.

3. **Selective catalytic reduction**

   The use of Selective Catalytic Reduction (SCR) has also been considered. In this technique, ammonia or urea solution is injected into the flue gases immediately upstream of a reactor vessel containing layers of catalyst. The NOx is converted into nitrogen, water and carbon dioxide, with the reaction most efficient in the temperature range 200 to 350°C.

   The catalyst is expensive, and to achieve a reasonable working life it is necessary to install the SCR downstream of the flue gas treatment plant. This is because the flue gas treatment plant removes dust which would otherwise cause deterioration of the catalyst.

   The reaction takes place at lower temperatures than SNCR methods, however, since the other flue gas cleaning reactions take place at an optimum temperature of approximately 140°C, the flue gases have to be reheated before entering the SCR. This requires some thermal energy which reduces the overall energy efficiency of the Facility. The catalytic reactor also creates additional pressure losses to be compensated by a bigger exhaust fan, reducing further the overall energy efficiency.

   SCR systems are considerably more complicated and more capital intensive than SNCR systems.

A quantitative BAT assessment of the available technologies has been undertaken and is presented in Appendix E, section 3. This assessment uses data obtained by Fichtner from a range of different projects using the technologies proposed in this application.

Table 12: BAT assessment – NOx abatement

Parameter	Units	SNCR	SCR	SNCR + FGR
NO_x released after abatement	tpa	30	20	30
NO_x removed	tpa	70	80	60
Photochemical Ozone Creation Potential (POCP)	t ethylene-eq pa	-1,100	-800	-1,100
Global Warming Potential	t CO_2 eq pa	100	200	100
Urea consumed	tpa	800	750	690
Total Annualised Cost	£ pa	£172,000	£386,000	£265,000

Parameter	Units	SNCR	SCR	SNCR + FGR
Average cost per tonne NO_x abated	£ p.t NO_x.	£2,460	£4,825	£4,420

As can be seen from the table above, applying SCR to the Facility:

1. increases the annualised costs by more than £114,000 per annum;
2. abates an additional 10 tonnes of NOx per annum;
3. reduces the benefit of the facility in terms of the global warming potential by approximately 100 tonnes of CO_2;
4. reduces reagent consumption by approximately 100 tonnes per annum; and
5. costs nearly 100% more per additional tonne of NOx abated, compared to an SNCR system.

The additional costs associated with SCR are not considered to represent BAT for the Facility. On this basis, SNCR is considered to represent BAT.

Including FGR to the SNCR system to abate NOx increases the cost per tonne of NOx abated by nearly 80%, and has a small effect on the environmental impact of the Facility.

The proposed designs do not include FGR. Therefore, taking the above into consideration, the use of SNCR without FGR is considered to represent BAT for the abatement of NOx within the Facility.

3.6.3 Acid Gas Abatement System

There are currently three technologies widely available for acid gas treatment on similar plants in the UK.

1. **Wet scrubbing**

   This involves the mixing of the flue gases with an alkaline solution of sodium hydroxide or hydrated lime. This has a good abatement performance, but it consumes large quantities of water, produces large quantities of liquid effluent which require treatment and has high capital and operating costs.

2. **Semi-dry**

   This involves the injection of quick lime as a slurry into the flue gases in the form of a spray of fine droplets. The acid gases are absorbed into the aqueous phase on the surface of the droplets and react with the quick lime. The fine droplets evaporate as the flue gases pass through the system, cooling the gas. This means that less energy can be extracted from the flue gases in the boiler, making the steam cycle less efficient. The quick lime and reaction products are collected on a bag filter, where further reaction can take place.

3. **Dry**

   This involves the injection of lime or sodium bicarbonate into the flue gases as a powder. The reagent is collected on a bag filter to form a cake and most of the reaction between the acid gases and the reagent takes place as the flue gases pass through the filter cake. In its basic form, the dry system consumes more reagent than the semi-dry system. However, this can be improved by recirculating the flue gas treatment residues, which contain some unreacted lime and reinjecting this into the flue gases. This is the method that is currently proposed for the Facility.

As explained in section 2.5, the Facility utilises a combination of wet and dry acid gas abatement systems for the abatement of acid gases. However, the primary acid gas abatement system is a dry

system, with the wet system polishing the emissions to ensure compliance with the BAT AEL's for acid gases.

Dry and semi-dry systems could both be utilised for the primary abatement of acid gases. The advantages and disadvantages of each technique are varied which makes assessment complex; therefore, the assessment methodology described in Horizontal Guidance Note H1 has been used and is detailed in Appendix E section 2.

For the purposes of this application we have undertaken a quantitative assessment of the available technologies for the primary abatement of acid gases.

The table below compares the options available.

Table 13: BAT assessment – acid gas abatement

Parameter	Units	Dry	Semi-Dry
SO_2 abated	tpa	10	10
Photochemical Ozone Creation Potential (POCP)	t ethylene-eq pa	50	50
Global Warming Potential	t CO_2 eq pa	200	400
Additional water consumption compared to a dry system	tpa		28,000
APC Residues	tpa	1,000	1,000
Annualised Cost	£ pa	£692,000	£679,000

The performance of the options is very similar.

The dry system only requires a small quantity of water for conditioning of the lime so that it is suitable for injection into the reaction chamber, whereas the semi-dry system requires the lime to be held in solution (quick lime). This requires significantly more water than a dry system.

In addition, the dry system has a reduced global warming potential and a reduced annualised cost.

Due to the low water consumption, reduced global warming potential and reduced annualised cost, the dry system is considered to represent BAT for the Facility.

3.6.4 Particulate Matter Abatement

The Facility will use a multi-compartment fabric filter for the control of particulates. There are a number of alternative technologies available, but none offer the performance of the fabric filter. Fabric filters represent BAT for this type of thermal treatment plant for the following reasons:

- Fabric filters are a proven technology and are used in a wide range of applications. The use of fabric filters with multiple compartments, allows individual bag filters to be isolated in case of individual bag filter failure.
- Wet scrubbers are not capable of meeting the same emission limits as fabric filters.
- Electrostatic precipitators are also not capable of abating particulates to the same level as fabric filters. They could be used to reduce the particulate loading on the fabric filters and so increase the acid gas reaction efficiency and reduce lime residue production, but the benefit is marginal and would not justify the additional expenditure, the consequent increase in power consumption and significant increase in the carbon footprint of the Facility.
- Ceramic Filters have been used for some HTIs which operate with higher flue gas temperatures, but are more prone to breakages than fabric filters.

Fabric filters are considered to represent BAT for the removal of particulates for the Facility.

The bag filter will not require a flue gas bypass station, as the bag filters will be preheated allowing start-up without a bypass, which is considered to represent BAT. Furthermore, the proposed bag filters are catalytic filters which will also provide additional abatement/polishing of NOx emissions prior to release to atmosphere.

3.7 The Legislative Framework

The relevant legislative requirements which are applicable to the Facility are as follows:

- Industrial Emissions Directive (2010/75/EU); and
- Waste Incineration BREF.

3.7.1 Specific Requirements of the Industrial Emissions Directive (2010/75/EU)

This section presents information on how the Facility will comply with the Waste Incineration requirements of the Industrial Emissions Directive (IED).

Chapter IV of the IED includes 'Special Provisions for Waste Incineration Plants and Waste Co-incineration Plants'. Review of provisions for waste incineration as presented in the IED has identified that the following requirements could be applicable to the Facility:

- Article 46 – Control of Emissions;
- Article 47 – Breakdown;
- Article 48 – Monitoring of Emissions;
- Article 49 – Compliance with Emission Limit Values;
- Article 50 – Operating Conditions;
- Article 52 – Delivery & Reception of Waste;
- Article 53 – Residues; and
- Article 55 – Reporting & public information on waste incineration plants and waste co-incineration plants.

The following table identifies the relevant Articles of the IED and explains how the Facility will comply with them. Many of the articles in the IED impose requirements on regulatory bodies, in terms of the permit conditions which must be set, rather than on the operator. The table below only covers those requirements which the IED imposes on 'Operators' and either explains how this is achieved or refers to a section of the application where an explanation can be found.

Table 14: Summary table for IED compliance

Article	Requirement	How met or reference
22(2)	Where the activity involves the use, production or release of relevant hazardous substances and having regard to the possibility of soil and groundwater contamination at the site of the installation, the operator shall prepare and submit to the competent authority a baseline report before starting operation of an installation or before a permit for an installation is updated for the first time after 7 January 2013. The baseline report shall contain the information necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities provided for under paragraph 3. The baseline report shall contain at least the following information: (a) information on the present use and, where available, on past uses of the site; (b) where available, existing information on soil and groundwater measurements that reflect the state at the time the report is drawn up or, alternatively, new soil and groundwater measurements having regard to the possibility of soil and groundwater contamination by those hazardous substances to be used, produced or released by the installation concerned. Where information produced pursuant to other national or Union law fulfils the requirements of this paragraph that information may be included in, or attached to, the submitted baseline report.	Not applicable as a Baseline Report was submitted with the original application. Grundon will maintain records on the ground conditions beneath the site throughout the lifetime of the Facility.
44	An application for a permit for a waste incineration plant or waste co-incineration plant shall include a description of the measures which are envisaged to guarantee that the following requirements are met: (a) the plant is designed, equipped and will be maintained and operated in such a manner that the requirements of this Chapter are met taking into account the categories of waste to be incinerated or co-incinerated;	Refer to Section 3.2.1 of the Supporting Information.
	(b) the heat generated during the incineration and co-incineration process is recovered as far as practicable through the generation of heat, steam or power;	Refer to section 3.8 of the Supporting Information.
	(c) the residues will be minimised in their amount and harmfulness and recycled where appropriate;	Refer to Section 3.9 of the Supporting Information.
	(d) the disposal of the residues which cannot be prevented, reduced or recycled will be carried out in conformity with national and Union law.	Refer to Section 3.9 of the Supporting Information.

Article	Requirement	How met or reference
46 (1)	Waste gases from waste incineration plants and waste co-incineration plants shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Refer to Appendix D – Air Quality Assessment.
46 (2)	Emissions into air from waste incineration plants and waste co-incineration plants shall not exceed the emission limit values set out in parts 3 and 4 of Annex VI or determined in accordance with Part 4 of that Annex.	Refer to Table 6.
46 (5)	Waste incineration plant sites and waste co-incineration plant sites, including associated storage areas for waste, shall be designed and operated in such a way as to prevent the unauthorised and accidental release of any polluting substances into soil, surface water and groundwater. Storage capacity shall be provided for contaminated rainwater run-off from the waste incineration plant site or waste co-incineration plant site or for contaminated water arising from spillage or fire-fighting operations. The storage capacity shall be adequate to ensure that such waters can be tested and treated before discharge where necessary.	Refer to Appendix C – Environmental Risk Assessment.
46 (6)	Without prejudice to Article 50(4)(c), the waste incineration plant or waste co-incineration plant or individual furnaces being part of a waste incineration plant or waste co-incineration plant shall under no circumstances continue to incinerate waste for a period of more than 4 hours uninterrupted where emission limit values are exceeded. The cumulative duration of operation in such conditions over 1 year shall not exceed 60 hours. The time limit set out in the second subparagraph shall apply to those furnaces which are linked to one single waste gas cleaning device.	Refer to Abnormal Emissions Assessment - Appendix D.
47	In the case of a breakdown, the operator shall reduce or close down operations as soon as practicable until normal operations can be restored.	Refer to Section 2.10 of the Supporting Information.
48 (2)	The installation and functioning of the automated measuring systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	Refer to Section 3.5.1.1 of the Supporting Information.
48 (4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Refer to Section 3.5.1 of the Supporting Information.

Article	Requirement	How met or reference
49	The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	Under normal operation, there will be no emissions from flue gas treatment systems to water/sewer from the waste incineration plant. Under abnormal operation, any process emissions to sewer will be released in accordance with limits set in a Trade Effluent Consent.
50 (1)	Waste incineration plants shall be operated in such a way as to achieve a level of incineration such that the total organic carbon content of slag and bottom ashes is less than 3% or their loss on ignition is less than 5% of the dry weight of the material. If necessary, waste pre-treatment techniques shall be used.	Refer to section 3.5.2.1. TOC or LOI testing.
50 (2)	Waste incineration plants shall be designed, equipped, built and operated in such a way that the gas resulting from the incineration of waste is raised, after the last injection of combustion air, in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of at least 1,100°C for at least two seconds.	It is understood that this requirement is not applicable to hazardous waste incineration plants.
50 (3)	Each combustion chamber of a waste incineration plant shall be equipped with at least one auxiliary burner. This burner shall be switched on automatically when the temperature of the combustion gases after the last injection of combustion air falls below the temperatures set out in paragraph 2. It shall also be used during plant start-up and shut-down operations in order to ensure that those temperatures are maintained at all times during these operations and as long as unburned waste is in the combustion chamber. The auxiliary burner shall not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil as defined in Article 2(2) of Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels (OJ L 121, 11.5.1999, p. 13.), liquefied gas or natural gas.	Refer to Sections 3.2.3.6 and 3.1.3.3 of the Supporting Information.
50 (4)	Waste incineration plants and waste co-incineration plants shall operate an automatic system to prevent waste feed in the following situations:	Refer to Section 3.2.3.6 of the Supporting Information.

Article	Requirement	How met or reference
	(a) at start-up, until the temperature set out in paragraph 2 of this Article or the temperature specified in accordance with Article 51(1) has been reached;	
	(b) whenever the temperature set out in paragraph 2 of this Article or the temperature specified in accordance with Article 51(1) is not maintained;	Refer to Section 3.2.3.6 of the Supporting Information.
	(c) whenever the continuous measurements show that any emission limit value is exceeded due to disturbances or failures of the waste gas cleaning devices.	Refer to Section 3.2.3.6 of the Supporting Information.
50 (5)	Any heat generated by waste incineration plants or waste co-incineration plants shall be recovered as far as practicable.	Refer to section 3.8 of the Supporting Information.
50 (6)	Infectious clinical waste shall be placed straight in the furnace, without first being mixed with other categories of waste and without direct handling.	This requirement will be met, as the bins are tipped directly onto the waste feed belt and fed into the furnace without being mixed prior.
52 (1)	The operator of the waste incineration plant or waste co-incineration plant shall take all necessary precautions concerning the delivery and reception of waste in order to prevent or to limit as far as practicable the pollution of air, soil, surface water and groundwater as well as other negative effects on the environment, odours and noise, and direct risks to human health.	Refer to Section 3.2 and 3.4.7 of the Supporting Information, and Appendix C – Environmental Risk Assessment.
52 (2)	The operator shall determine the mass of each type of waste, if possible according to the European Waste List established by Decision 2000/532/EC, prior to accepting the waste at the waste incineration plant or waste co-incineration plant.	Refer to Section 3.2.1 of the Supporting Information.
53 (1)	Residues shall be minimised in their amount and harmfulness. Residues shall be recycled, where appropriate, directly in the plant or outside.	Refer to Sections 3.2.3 and 3.9 of the Supporting Information.
53 (2)	Transport and intermediate storage of dry residues in the form of dust shall take place in such a way as to prevent dispersal of those residues in the environment.	Refer to Section 3.9 of the Supporting Information.
53 (3)	Prior to determining the routes for the disposal or recycling of the residues, appropriate tests shall be carried out to establish the physical and chemical characteristics and the polluting potential of the residues. Those tests shall concern the total soluble fraction and heavy metals soluble fraction.	Refer to Section 3.9 of the Supporting Information.

3.7.2 Waste Incineration BREF

The Final Waste incineration (WI) BREF BAT conclusions were published by the European IPPC Bureau in December 2019. New waste incineration plants are required to demonstrate that they meet the requirements of the BREF when applying for an EP. As such, the table below identifies the requirements of the Best Available Techniques (BAT) conclusions as set out in the BREF and explains how the Facility will comply with them.

Table 15: Summary table for WI BREF BAT conclusions compliance – Facility

#	BAT Conclusion	How met or reference
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 features as listed in BAT 1 of the BREF.	Grundon has an ISO14001 accredited EMS. This will be extended to include the operation of the Facility. Grundon is proposed that a pre-operational condition is included within the EP which requires is to provide a summary of the EMS which will be implemented at the Facility prior to commencement of commissioning. The summary will demonstrate how the proposed EMS complies with the requirements as set out in BAT 1.
2	BAT is to determine either the gross electrical efficiency, the gross energy efficiency, or the combined boiler efficiency of the incineration plant as a whole or of all the relevant parts of the incineration plant.	In accordance with the EAs BREF Implementation Plan, new hazardous waste incineration facilities are required to achieve a boiler efficiency of 60-80%. As set out in section 3.8, the boiler will have an efficiency of >90%. Therefore, Grundon understands that this is in accordance with the requirements of BAT 2. Further detail on the energy efficiency of the ERF is set out within section 3.8.
3	BAT is to monitor key process parameters relevant for emissions to air and water including those given in BAT 3 of the BREF.	As set out in section 3.5.2 of the Supporting Information, the process parameters for monitoring of emissions to air are as follows: • water vapour content • temperature; and • pressure. The oxygen content and flow rate of the flue gases will also be monitored. Temperature will be monitored in the combustion chamber.

#	BAT Conclusion	How met or reference
		Where appropriate, process effluents would be contained and re-used in the process. Excess process effluents will either be discharged to sewer in accordance with a Trade Effluent Consent, or tankered off-site for treatment. Taking the above into consideration, the process parameters to be monitored for emissions to water as listed in BAT 3 do not apply. Grundon can confirm that the Facility will include for monitoring of the key process parameters relevant for emissions to air in accordance with BAT 3.
4	BAT is to monitor channelled emissions to air with at least the frequency given in BAT 4 of the BREF 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.	It is anticipated that emissions to air will be monitored with the following frequency: <u>Continuous Monitoring</u> • Oxygen; • Carbon monoxide; • Hydrogen chloride; • Sulphur dioxide; • Nitrogen oxides; • Ammonia; • Volatile organic compounds (VOCs); and • Particulates. <u>Periodic Monitoring</u> • Hydrogen fluoride; • Group 3 heavy metals (Sb, As, Pb, Cr, Co, CU, Mn, Ni, V) – once every six months; • Cadmium and thallium – once every six months; • Mercury – once every six months; • Nitrous oxide – once every year; • Dioxins and furans - once every six months (except long-term sampling of PCDD/F once every month); and

#	BAT Conclusion	How met or reference
		• Dioxin-like PCBs (once every six months for short-term sampling, once every month for long-term sampling). As set out in section 3.5.1.1 of the Supporting Information, the methods and standards used for emissions monitoring will be in compliance with EPRS5.01 and the IED. In particular, the CEMS equipment will be certified to the MCERTS standard and will have certified ranges which are no greater than 1.5 times the relevant daily average emission limit. Sampling and analysis of all pollutants including dioxins and furans will be carried out to CEN or equivalent standards (e.g. ISO, national, or international standards). This ensures the provision of data of an equivalent scientific quality. Grundon considers that the proposals for monitoring of emissions to air are in accordance with the requirements of BAT 4.
5	BAT is to appropriately monitor channelled emissions to air from the incineration plant during Other Than Normal Operating Conditions (OTNOC).	The EA recently published its BREF implementation plan, which states how monitoring of PCCD/F and dioxin-like PCB mass emissions during a planned start-up and shut-down should be carried out following the successful commissioning of the plant. It is also stated that the test should be repeated once every 3 years. However, it is acknowledged that monitoring of PCCD/F and dioxin-like PCB mass emissions should be done on 'best endeavours' basis, bearing in mind the challenges of coinciding a visit by the monitoring company with the exact time when the plant is starting up or shutting down. Specifically, the implementation document states that no plant will be required to start up or shut down specifically for the purposes of testing, and that where reasonable attempts to monitor fail due to the challenges described above, operators will be expected to attempt to repeat the exercise at the next available opportunity. Taking the above into consideration, Grundon will apply a 'best endeavours' basis to the monitoring of PCCD/F and dioxin-like PCB mass emissions during start-up / shutdown periods. It is understood that this is in compliance with the requirements of BAT 5 and the EA's implementation plan.
6	BAT is to monitor emissions to water from Flue Gas Cleaning (FGC) and/or bottom ash treatment with at least	As explained in section 2.5 of the Supporting Information, the Facility will utilise a wet flue gas treatment system for the abatement of acid gases.

#	BAT Conclusion	How met or reference
	the frequencies set out in BAT 6 of the BREF 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.	The blowdown from the wet flue gas treatment system will be collected in a sump/tank, and either discharged to foul sewer or transferred off-site to a suitably licenced waste treatment facility. Grundon will undertake monitoring of the effluent from the wet scrubber in accordance with the relevant EN standards.
7	BAT is to monitor the content of unburnt substances in slags and bottom ashes at the incineration plant with at least the frequency as given in BAT 7 of the BREF (at least once every 3 months) and in accordance with EN standards.	As explained in section 3.2.3.2 of the Supporting Information, Total Organic Carbon (TOC) will be measured in the bottom ash to confirm that it is less than 3%, and/or Loss on Ignition (LOI) will be measured to confirm it is less than 5%. Measurements will be taken at least once every 3 months and will be in accordance with EN standards and would be taken at the adjacent IBA facility where the IBA will be stored. Grundon considers that the proposals for monitoring of slags and bottom ashes are in accordance with the requirements of BAT 7.
8	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, wastewater) after the commissioning of the incineration plant and after each change that may significantly affect the POP content in the output streams.	Due to the high temperatures required due to the nature of the waste proposed to be processed at the Facility, and from experience gained at the Colnbrook HTI, Grundon is confident that any POPs within the waste will be fully burnt out. Grundon would propose to demonsra te this through the commissioning of the Facility.
9	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) as listed in BAT 9 of the BREF, and, where relevant, also techniques (d), (e) and (f).	As described in sections 2.1.2 and 3.2 of the Supporting Information, the Facility will employ the following techniques as required by BAT 9: • Determination of the types of waste that can be incinerated. The Facility will incinerate waste in accordance with the list of EWC waste codes that will be listed in the EP, and waste that falls into the range of calorific values in accordance with the design of the Facility. The list of EWC codes will characterise the physical state, general characteristics and hazardous properties of the waste. • Implementation of waste acceptance procedures. The Facility will accept a mix of wastes delivered both directly to the site and also from the adjacent waste

#	BAT Conclusion	How met or reference
		transfer station. Grundon will develop acceptance procedures for wastes delivered to the Facility, in order to ensure that only the wastes which the Facility is permitted to receive are received at the Facility. Paperwork accompanying each delivery will be checked. Periodic inspections of the waste will be undertaken as part of the scope where practicable, prior to transfer into the bunker, to confirm that it complies with the specifications of the waste transfer note (WTN). Waste delivered in road vehicles will be inspected by the crane operator as it is tipped into the bunker and mixed. • Grundon will implement its existing waste pre-acceptance and acceptance procedures at the Facility, refer to Appendix I. The waste acceptance procedures will identify the records required for wastes to be accepted at the Facility and where records associated with the waste should be retained in the document management system which will be employed at the Facility. • Waste acceptance procedures will be used to identify any unacceptable wastes which are not suitable for processing within the Facility and require quarantine and transfer off-site. • The Facility Chemists will develop blends of waste types which can be processed for specific periods of time to enable a blended approach to the waste feed. Grundon considers that the proposed arrangements for the receipt and segregation of waste complies with the requirements of BAT 9.
10	In order to improve overall environmental performance of the bottom ash treatment plant, BAT is to set up and implement an output quality management system (see BAT 1).	It can be confirmed that the EMS in place at the site will include for the output quality management features stated in the BREF that are applicable to the bottom ash treatment plant (IBA facility).
11	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 9c) including, depending on the risk	As described in sections 2.1.2 and 3.2 of the Supporting Information, and explained in relation to BAT 9 above, periodic monitoring of waste deliveries will be undertaken at the Facility. This will include the following elements in accordance with BAT 11:

#	BAT Conclusion	How met or reference
	posed by the waste, the elements as listed in BAT 11 of the BREF.	• Weighing of the waste deliveries by use of a weighbridge at the entrance/exit of the Facility. • Periodic visual inspection of the incoming waste when it is delivered to the Facility/received in the Waste Reception Area. • Periodic sampling of waste deliveries and analysis of key properties, such as calorific value and metal content. – Sampling will be undertaken when accepting a new waste stream at the Facility (e.g. from a new waste supplier), or to determine the NCV of waste sources accepted should the plant be operating outside the permitted range shown on the firing diagram. Periodic sampling of waste will also be undertaken for waste streams to ensure consistency in parameters. It is expected that waste sampling and characterisation would be carried out in accordance with BS EN 14899:2005 'Characterization of waste - Sampling of waste materials - Framework for the preparation and application of a Sampling Plan', and will be consistent with any additional requirements imposed by the EP. For both health & safety and practical reasons, Grundon is not proposing to undertake sampling of radioactive wastes received at the Facility. Grundon will only undertake monitoring of the surface dose rate of incoming radioactive wastes. However, in accordance with the regulatory requirements for the transfer, storage and handling of radioactive wastes, comprehensive characterisation tests are undertaken by producers of radioactive wastes and declaration forms are required to be completed to ensure full transparency of data/information on the wastes. All radioactive waste containers will carry unique identifiers, enabling cross referencing with the declarations. Grundon considers that the proposed arrangements for monitoring the waste deliveries as part of the waste acceptance procedures complies with the requirements of BAT 11.

#	BAT Conclusion	How met or reference
12	In order to reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the following techniques: Use impermeable surfaces with an adequate drainage infrastructure; and Have adequate waste storage capacity.	The surfaces of the waste reception, handling and storage areas have been designed and will be constructed as impermeable structures. Adequate drainage infrastructure is installed in areas where waste will be received, handled and stored – these areas will have appropriate falls to the process water drainage system. The integrity of areas of hardstanding will be periodically verified by visual inspection. Regular maintenance of the drainage systems will be undertaken. Adequate waste storage capacity will be available on site – the maximum waste storage capacity of the waste reception areas will not be exceeded. Along with use of the waste tracking system, the quantity of waste will be visually monitored against the maximum storage capacity. During periods of planned maintenance, quantities of waste within the waste reception will be run down where possible. Grundon considers that the proposed arrangements for environmental risks associated with the reception, handling and storage of waste comply with the requirements of BAT 12.
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 as listed in BAT 13 of the BREF.	Grundon will utilise the following measures to reduce the environmental risks associated with the storage and handling of clinical waste: • Automated or semiautomated waste handling - clinical wastes are fed into the furnace by an automated feeding system; • Incineration of non-reusable sealed containers – Certain clinical wastes, such as sharps will be delivered in sealed and robust combustible containers that are never opened throughout storage and handling operations. • Cleaning and disinfection of reusable containers - Reusable clinical waste containers are cleaned and disinfected in a Bin Wash facility. Grundon considers that the proposed arrangements for environmental risks associated with the storage and handling of clinical waste comply with the requirements of BAT 12.
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,	A advanced control system, incorporating the latest advances in control and instrumentation technology, will be utilised at the Facility to control the combustion process, optimise the process relative to efficient heat release, to

#	BAT Conclusion	How met or reference
	and to reduce emissions to air from the incineration of waste, BAT is to use an appropriate combination of the techniques given below:	ensure good burn-out and minimum particle carry over. As described in Section 3.5.2 of the Supporting Information, the system will control and/or monitor the main features of the plant operation including, but not limited to the following: • Combustion air; • Fuel feed rate; • SNCR system; • Flue gas oxygen concentration at the boiler exit; • Flue gas composition at the stack; • Combustion process; • Boiler feed pumps and feedwater control; • Steam flow at the boiler outlet; • Steam outlet temperature and pressure; • Boiler drum level control; and • Flue gas control. Water, electricity and auxiliary fuel usage will also be monitored to highlight any abnormal usage. Grundon considers that the proposed arrangements for ensuring 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 comply with the requirements of BAT 14.
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, as and when needed and practicable, based on the characterisation and control of the waste.	The Facility will be controlled from a dedicated control room, with a control system to optimise the combustion process. The system will control and/or monitor the main features of the plant operation, as described in the response to BAT 14 above. Emissions to air will be reduced by the adjustment of the settings through the control system:

#	BAT Conclusion	How met or reference
		• the dose rate for ammonia solution within the SNCR system will be optimised and adjusted to minimise the ammonia slip; • lime usage will be minimised by trimming reagent dosing to accurately match the acid load using fast response upstream acid gas monitoring; and • PAC dosing will be based on flue gas volume flow measurement. Grundon considers that the proposed control systems will ensure that the Facility is designed to allow for the adjustment of the plant's settings to comply with the requirements of BAT 15.
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.	The Facility will operate continuously, with planned shutdowns for maintenance limited as far as reasonably practicable. Waste will be kept at suitable level within the waste reception area to maintain operation during periods when waste is not delivered. Operational procedures will be developed to limit as far as practicable shutdown and start-up operations. Grundon considers that the operation of the Facility will limit as far as practicable shutdown and start-up operations to comply with the requirements of BAT 16.
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 concentration), operated within their design range, and maintained so as to ensure optimal availability.	The flue gas treatment systems will be appropriately designed and operated within the design range. The flue gas treatment systems will be subject to regular maintenance through the implementation of documented management procedures. Grundon considers that the design and operation of the flue gas treatment systems will ensure that emissions to air (and water where applicable) are reduced, and will ensure their optimal availability, to comply with the requirements of BAT 17.
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 EMS that includes the elements as identified in BAT 18 of the BREF.	The EA's BREF implementation document sets out a definition of OTNOC, and lists requirements for OTNOC management plans. It is acknowledged in the implementation document that further work is required by the EA in relation to the production of guidelines for plant start-up and shut-downs, update of abnormal operation guidance, and clarification of the EAs position on emergency/uncontrolled shutdowns and temporary shutdowns. At the time of

#	BAT Conclusion	How met or reference
		writing, the EA has commenced consultation with industry and is in the process of finalising its guidance. Upon finalisation of the EA's guidance, Grundon would propose to develop an OTNOC based management plan which is in line with the EA's requirements and the elements outlined within the BREF. It is expected that this would be achieved by either a pre-operational or improvement condition in the EP. Grundon considers that the incorporation of a risk-based OTNOC management plan will ensure the Facility's compliance with BAT 18.
19	In order to increase resource efficiency of the incineration plant, BAT is to use a heat recovery boiler.	The Facility will utilise a steam boilers to produce steam which is used to generate electricity. The Facility is designed with the provision to export heat to local users. Grundon considers that the use of heat recovery boilers is in direct compliance with the requirements of BAT 19.
20	In order to increase energy efficiency of the incineration plant, BAT is to use an appropriate combination of techniques as listed in BAT 20 of the BREF.	The Facility will utilise the following techniques to increase energy efficiency from its operation: • Minimise heat losses via the use of integral furnace boilers – heat will be recovered from the flue gases by means of steam boiler integral with the furnaces; • Optimisation of the boiler design to improve heat transfer – the boilers will is designed to optimise the thermal cycle efficiency without prejudicing boiler tube life, having regard for the nature of the waste that is combusted; • Cogeneration of heat and electricity – the Facility has been designed as a combined heat and power plant, refer to section 3.8, and could export heat to local users if suitable commercial agreements can be reached. Grundon considers that the techniques listed above will increase the energy efficiency of the plant and ensure that the ERF will comply with the requirements of BAT 20.

#	BAT Conclusion	How met or reference
21	In order to prevent or reduce diffuse emissions from the incineration plant, including odour emissions, BAT is to use the methods as stated in BAT 21 of the BREF.	In accordance with the BREF, the ERF will employ the following measures to reduce odour emissions: • Waste will stored in the enclosed waste reception area. Air will extracted from within the building to be used as combustion air for incineration. • The operation of the Facility will not give rise of odorous liquid wastes. Therefore, the requirement to store liquid wastes in tanks under controlled pressure and duct the tank vents to the combustion air feed or other suitable abatement system will not apply to the ERF. • Odour will be controlled during shutdown periods by minimising the amount of waste in storage. Waste will be run-down prior to periods of planned maintenance. During periods of shutdown waste will be diverted to the adjacent waste transfer station. The measures listed above to reduce odour emissions will ensure that the ERF will comply with the requirements of BAT 21.
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.	As explained in sections 2.1.2.2 and 2.1.2.3, volatile liquids and compressed gases will be injected directly into the top section of the kiln/base of the secondary combustion chamber. Grundon considers that this complies with the requirements of BAT 22.
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 EMS the following diffuse dust emission management features:	Treatment of slags and ashes will not be undertaken as the Facility. Therefore, Grundon understands that BAT 23 is not applicable.
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 as given in BAT 24 of the BREF.	Treatment of slags and ashes will not be undertaken as the Facility. Therefore, Grundon understands that BAT 24 is not applicable.

#	BAT Conclusion	How met or reference
25	In order to reduce channelled emission to air of dust, metals and metalloids from the incineration of waste, BAT is to use one or a combination of the techniques as listed in BAT 25 of the BREF.	In accordance with the BREF, the following techniques will be utilised at the ERF to reduce channelled emissions to air: • Bag filters – to reduce particulate content of the flue gas. • Dry sorbent injection – adsorption of metals by injection of PAC in combination with injection of lime to abate acid gases. • Wet scrubber – sodium hydroxide to abate acid gases, and water wash to abate emissions of particulates and heavy metals The concentrations of metals and metalloids will be monitored in accordance with the EP. It is considered by Grundon that the techniques listed above to reduce channelled emissions to air will ensure that the ERF will comply with the requirements of BAT 25.
26	In order to reduce channelled dust emissions to air from the enclosed treatment of slags and bottom ashes with extraction of air, BAT is to treat the extracted air with a bag filter.	Treatment of slags and ashes will not be undertaken as the Facility. Therefore, Grundon understands that BAT 24 is not applicable.
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 as listed in BAT 27 of the BREF.	BAT 27 of the BREF states that BAT is to use one or a combination of the following techniques: • Wet scrubber; • Semi-wet absorber; • Dry sorbent injection; • Direct desulphurisation (only applicable to fluidised beds); and • Boiler sorbent injection. As explained within section 2.5, the Facility will utilise a two stage flue gas treatment system which will utilise both wet and dry acid gas abatement systems, namely: • Dry sorbent injection, utilising lime as the reagent; and • Wet scrubber, utilising sodium hydroxide within the scrubber.

#	BAT Conclusion	How met or reference
		The two stage system will be designed to ensure that the Facility will operate in accordance with the relevant ELVs, assumed to be the BAT-AELs, without the requirement for any additional abatement measures. Grundon considers that the proposed that the two stage flue gas treatment system is in accordance with the requirements of BAT 27.
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 optimised and automated reagent dosage, or both the previous technique and the recirculation of reagents.	In accordance with the BREF, the following techniques will be employed at the Facility to reduce peak emissions of HCl, HF and SO_2 whilst limiting reagent consumption and residue generation from dry sorbent injection: • The concentration of hydrogen chloride in the flue gases upstream of the flue gas treatment system will be measured in order to optimise the performance of the emissions abatement equipment, including automated reagent dosage. • The concentrations of HCl, HF and SO_2 released from the ERF will comply with the relevant BAT-AELs. The techniques listed above to reduce channelled peak emissions to air of acid gases will ensure that the Facility will comply with the requirements of BAT 28.
29	In order to reduce channelled NOx emissions to air while limiting emissions of CO and N_2O from the incineration of waste, and the emissions of NH_3 from the use of SNCR and/or SCR, BAT is to use an appropriate combination of the techniques as listed in BAT 29 of the BREF.	The following elements have been incorporated into the design of the ERF: • Optimisation of the incineration process via the use of a modern combustion control system and monitoring of process parameters (refer to the response to BAT 14); • An SNCR system; • Catalytic bag filters; and • Optimisation of the design and operation of the SNCR system (through CFD modelling to optimise the location and number of injection nozzles, and optimisation of reagent dosing to minimise ammonia slip). The design elements listed above to reduce channelled NOx emissions to air (whilst limiting emissions of CO, N_2O and NH_3) will ensure that the Facility will comply with the requirements of BAT 29.

#	BAT Conclusion	How met or reference
		As justified in section 3.6.2 of the Supporting Information, flue gas recirculation is not currently proposed in the design of the Facility.
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 to reduce channelled emissions to air of organic compounds: 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; and i) Carbon sorbent in a wet scrubber.	The Facility will employ the following techniques to reduce channelled emission to air of organic compounds: • Optimisation of the combustion process – the boiler is designed to minimise the formation of dioxins and furans as follows: • Minimise residence time in critical cooling section to avoid slow rates of combustion gas cooling, minimising the potential for 'de-novo' formation of dioxins and furans. • Apply CFD modelling to the design where appropriate to ensure gas velocities are in a range that negates the formation of stagnant pockets/low velocities. • Minimise volume in critical cooling sections. • Prevent boundary layers of slow-moving gas along boiler surfaces via good design and regular maintenance. • Online and offline boiler cleaning through a regular maintenance schedule to reduce dust residence time and accumulation in the boiler, thus reducing PCDD/F formation in the boiler. • Dry sorbent injection using PAC and lime, in combination with catalytic bag filters. The concentrations of dioxins and furans released from the Facility will comply with BREF limits. As described above, it can be confirmed that the Facility will use techniques (a) – (e) and (h), to reduce channelled emissions to air of organic compounds. The techniques described above to reduce channelled emission to air of organic compounds will ensure that the ERF will comply with the requirements of BAT 30. Therefore, the ERF will meet the requirements of BAT 30 without the use of catalytic filter bags.

#	BAT Conclusion	How met or reference
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 as listed in BAT 31 of the BREF.	In accordance with the BREF, dry sorbent injection of PAC will be employed at the ERF in combination with a catalytic bag filter. It is considered by Grundon that the use of these techniques will ensure that the Facility will comply with the requirements of BAT 31.
32	In order to prevent the contamination of uncontaminated water, to reduce emissions to water, and to increase resource efficiency, BAT is to segregate waste water streams and to treat them separately, depending on their characteristics.	There will be separate domestic effluents, process effluents and surface water drainage. Further information on the drainage arrangements is presented within section 2.9. An indicative water flow diagram depicting the segregation of different water streams for the Facility is presented in Appendix A. It is considered by Grundon that the segregation and treatment of different wastewater streams, as described above, will ensure that the Facility will comply with the requirements of BAT 32.
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 as listed in BAT 33 of the BREF.	In accordance with the BREF, the following techniques will be utilised at the Facility to reduce water usage and prevent wastewater generation: • Use of a flue gas treatment system that does not generate wastewater – by utilising dry sorbent injection of lime and PAC. • Where practicable process effluents will be re-used within the process. Excess amounts of process effluent (such as the treated wet scrubber effluent) will require discharge; these will either be discharged to sewer in accordance with a Trade Effluent Consent or tankered off-site for treatment at a suitably licensed waste management facility. It is considered by Grundon that the techniques listed above to reduce water usage and prevent/reduce the generation of wastewater will ensure that the Facility will comply with the requirements of BAT 33. Technique (d) of BAT 33 relates to dry bottom ash handling. As described and justified within the response to BAT 20(i) above, dry bottom ash handling is not considered to represent BAT for the site.

#	BAT Conclusion	How met or reference
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 as listed in BAT 34 of the BREF, and to use secondary techniques as close as possible to the source in order to avoid dilution.	The proposed counter-current rotary kiln design does not require quenching of the bottom ash. Therefore, BAT 34 is not considered to be applicable to the Facility.
35	In order to increase resource efficiency, BAT is to handle and treat bottom ashes separately from FGC residues.	It can be confirmed that bottom ash and APCr will be handled and disposed of separately at the site. Therefore, the Facility will comply with the requirements of BAT 35.
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 as listed in BAT 36 of the BREF, based on a risk assessment depending on the hazardous properties of the slags and bottom ashes.	There will be no treatment of bottom ash undertaken at the Facility. Therefore, the requirements of BAT 36 are not applicable.
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 as listed in BAT 37 of the BREF.	In accordance with the requirements of BAT 37, it can be confirmed that the following techniques will be employed at the site to prevent or reduce noise emissions: • Appropriate location of equipment and buildings – in accordance with normal industry practice, the technology provider will implement an efficient layout to result in relatively quiet operational noise levels. • Operational measures – regular inspection and maintenance of equipment will be undertaken. Doors to buildings will remain closed as far as is reasonably practicable. Waste deliveries will take place primarily during daytime hours. • Low-noise equipment – process equipment will be selected by the technology provider with, where appropriate, reduced noise levels. • Noise attenuation – plant rooms will have been acoustically designed for limiting noise emissions to acceptable levels for compliance with relevant workplace regulations.

#	BAT Conclusion	How met or reference
		• Noise-control equipment/infrastructure – where appropriate, acoustic abatement measures will be installed on equipment and buildings. Refer to the Noise Assessment presented in Appendix B for further details on noise mitigation measures proposed for the site. The techniques listed above to reduce noise emissions, and will ensure that the Facility will comply with the requirements of BAT 37.

3.8 Energy Efficiency General

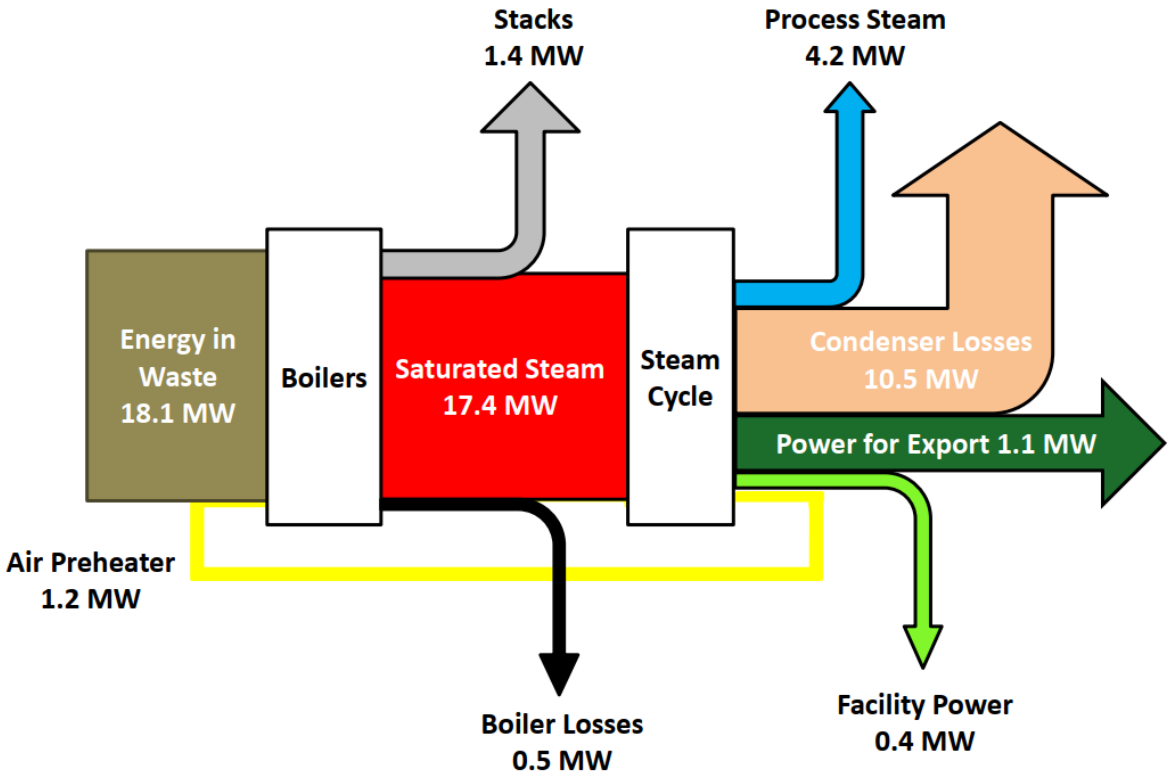
The Facility will utilise a waste heat recovery boiler which will generate saturated steam at 21 bar (a) and 215°C. The steam will be supplied. to a single stage steam turbine generator set. Provision has been for heat export from the Facility; however, at this stage there are no agreements in place with heat users for the export of heat from the Facility. In accordance with the requirements of the EP, Grundon will continue to investigate opportunities to export heat to local heat users, and provide periodic updates to the EA on the investigations.

In case of failure of the electricity supply, an emergency diesel generator will be provided to safely shut down the Facility and to provide an emergency supply to the rest of the Facility.

In considering the energy efficiency of the Facility, due account has been taken of the requirements of DEFRA and EA guidance titled *'Energy efficiency standards for industrial plants to get environmental permits'*, dated February 2016.

3.8.1 Basic Energy Requirements

An indicative Sankey Diagram for the Facility is presented in Figure 3.



Based on the nominal design capacity with no heat export

Figure 3: Indicative Sankey Diagram

With regards new hazardous waste incineration plant, the EA's Implementation Plan for the Waste Incineration BREF states:

New plants will be expected to meet the relevant BAT-AEELs under BAT 20 in the WI BATCs for boiler efficiency and to maximise plant efficiency through electricity generation and/or heat supply as far as practicable.

In this regard, based on the design as presented in the Sankey Diagram, the boiler efficiency has been calculated as approximately 95%, which compares favourably with the boiler efficiency requirements of the

3.8.1.1 Energy Consumption and Thermal Efficiency

The most significant energy consumers are anticipated to be the following:

- primary and secondary combustion air fans;
- Induced Draft fans;
- boiler feed water pumps;
- ACC fans;
- air compressors;
- waste handling and loading systems and residue conveying systems; and
- offices and ancillary rooms.

The Facility has been designed with careful attention being paid to all normal energy efficiency design features, such as high efficiency motors, high efficiency variable speed drives, high standards of cladding and insulation etc.

The Facility will also be designed to achieve a high thermal efficiency. In particular:

- Unnecessary releases of steam and hot water will be avoided, to avoid the loss of boiler water treatment chemicals and the heat contained within the steam and water;
- Provision will be made for heat to be exported to adjacent facilities;
- Steady operation will be maintained where necessary by using auxiliary fuel firing; and
- Boiler heat exchange surfaces will be cleaned on a regular basis to ensure efficient heat recovery.

Due consideration will be given to the recommendations given in the relevant Sector Guidance Notes.

3.8.1.2 Operating and Maintenance Procedures

An O&M manual and procedures will be developed for the Facility. The O&M manual and procedures will include for the following aspects:

1. Good maintenance and housekeeping techniques and regimes across the whole plant.
2. Plant Condition Monitoring will be carried out on a regular basis. This will ensure, amongst other things, that motors are operating efficiently, insulation and cladding are not damaged and that there are no significant leaks.
3. Operators will be trained in energy awareness and will be encouraged to identify opportunities for energy efficiency improvements.

Due consideration would be given to the recommendations given in the Environment Agency sector guidance on waste incineration, titled *'Incineration of waste (EPR5.01)'* and waste treatment activities *'Recovery and disposal of hazardous and non-hazardous waste (S5.06)'*.

3.8.1.3 Energy Efficiency Measures

An energy efficiency plan will be built into the operation and maintenance procedures of the Facility ensuring maximum efficiency, practical, sustainable, safe and controllable processes. This plan will be reviewed regularly as part of the environmental management systems.

During normal operation, procedures will be reviewed and amended, where necessary, to include improvements in efficiency as and when proven new equipment and operating techniques become available. These are assessed on the implementation cost compared with the anticipated benefits.

3.8.2 Further Energy Efficiency Requirements

In accordance with the requirements of the IED, heat must be recovered as far as practicable. In order to demonstrate this, the following points should be noted.

1. Economisers are installed to recover flue gas heat, compatibly with the temperature requirements of the flue gas treatment system.
2. The boiler will operate with saturated steam.

The Facility will not be subject to a Climate Change Levy agreement.

3.9 Residue Recovery and Disposal

3.9.1 Introduction

The main residue streams arising from the facility are:

1. Bottom ash;
2. Metals and oversize materials; and
3. Air Pollution Control residues (APCr).

As described below, the waste recovery and disposal techniques will be in accordance with the indicative BAT requirements.

Prior to the transfer of residues to any residues off-site, where appropriate, the residues will be tested in accordance with the requirements of Technical Guidance WM2: '*Hazardous Waste: Interpretation of the definition and classification of hazardous waste'*.

Any materials which are to be transferred to landfill from the Facility will be Waste Acceptance Criteria (WAC) tested – leachability tested – to ensure that they meet the WAC for the landfill that they are to be transferred to.

In accordance with the requirements of Article 4 (Waste Hierarchy) of the Waste Framework Directive, which sets out the priorities for the prevention and management of waste, Grundon Waste Management Ltd will review the options for the recovery and recycling of all residues generated by the Facility.

3.9.2 Bottom Ash

Ash which is collected in the boiler (boiler ash) will be mixed with ash which comes off from underneath the rotary kiln (bottom ash). Due to the nature of the waste being processed at the Facility the bottom ash generated will be transferred to landfill for disposal.

3.9.3 Metals and oversize materials

Bottom ash will fall by gravity into an ash discharge screw conveyor situated underneath the ash chamber. Larger items that would otherwise damage the ash discharge screw conveyor will be automatically filtered out based on size (with a 140 mm diameter screen) and collected in a separate container inside the ash chamber.

A drum type magnetic separator will be installed at the outlet of the ash chamber to extract metals from the bottom ash. This will be an enclosed system to limit dust emissions.

3.9.4 Air Pollution Control residue

APCr is predominantly composed of calcium as hydroxide, carbonate, sulphate and chloride/hydroxide complexes. Typical major element concentration ranges for the UK residues are as follows:

- 30-36% w/w calcium;
- 12-15% w/w chlorine;
- 8-10% w/w carbonate (as C); and
- 3-4% w/w sulphate (as S).

Silicon, aluminium, iron, magnesium and fluorine are also present in addition to traces of dioxins and the following heavy metals: zinc, lead, manganese, copper, chromium, cadmium, mercury, and arsenic.

APCr is classified as hazardous (due to its elevated pH) in accordance with EA technical guidance *'WM3: Waste Classification – Guidance on the classification and assessment of waste'*.

To minimise fugitive dust emissions, APCr collected in big bags will be stored in a covered roll-on-off skip prior to transfer off-site for disposal in a hazardous landfill.

3.9.5 Summary

The expected quantities and properties of the main residue streams generated from the operation of the Facility are summarised in Table 16.

Table 16: Key residue streams from the Facility

Source/ Material	Properties of Residue	Storage location/ volume stored	Annual quantity of residue produced (estimate)	Disposal Route and Transport Method	Frequency
Bottom ash	Ash from underneath the rotary kiln mixed with any boiler ash. Due to the nature of the waste being incinerated, the bottom ash from the	Bottom ash will be stored in a covered roll-on-roll-off skip outside the main building.	5,000 tonnes	To be removed offsite in HGVs for disposal via landfill.	2-3 loads per week

Source/ Material	Properties of Residue	Storage location/ volume stored	Annual quantity of residue produced (estimate)	Disposal Route and Transport Method	Frequency
	Facility requires disposal in landfill.				
APCr	Ash from the flue gas treatment process, may contain some unreacted lime. Hazardous waste requiring disposal in a specialist landfill.	Big bags stored in a covered roll-on-roll-off skip outside the main building.	1,000 tonnes	Transfer in transport container to specialist waste disposal facility for landfilling.	2-3 loads per week

3.10 Management

As defined in the Regulation 7 of the Environmental Permitting Regulations, the operator is 'the person who has control over the operation of a regulated facility'. Grundon will directly manage the day-to-day operation of the different waste treatment processes.

Grundon has an existing management system which has been accredited to the ISO 14001 Environmental Management System Standard. The existing management systems will be extended to include the operation of the Facility.

Grundon considers that the ISO 14001 certification to be of considerable importance and relevance to a waste incineration facility. It is an assurance to the local authority, regulator, neighbours, and others alike that the Facility's operation is undertaken in strict compliance with the regulations in force and with the management seeking continual improvements. It requires the company to work in a transparent way, to maintain and improve the confidence of regulators and neighbours, and to have a proactive approach to environmental improvement.

3.10.1 Scope and Structure

The scope of the ISO 14001 certification will cover the receipt, handling and combustion of waste and the transfer of residues off-site.

The scope of the ISO 14001 certification for the Facility will cover three key areas. These are:

- The design and development of the plant;
- The operation of the plant; and
- The processing of controlled waste.

Where applicable, documented procedures will detail specifically how each activity is to be controlled. These will be contained in an 'Environmental Procedures Manual' and identified related documents.

The site EMS will contain procedures for accident management that comply with the requirements set out in Agency guidance "How to comply with your Environmental Permit" EPR1.00. This will be in the form of an accident management plan that will be developed before the plant is commissioned.

3.10.2 General Requirements

Grundon will maintain the EMS in accordance with the ISO:14001 standard. The EMS objectives and scope will include the following requirements:

- Identifying potential environmental impacts;
- Documenting and implementing standard procedures to mitigate and control these impacts;
- Determining a procedural hierarchy that considers the interaction of the relevant processes;
- Ensuring adequate responsibility, authority and resources to management necessary to support the EMS;
- Establishing performance indicators to measure the effectiveness of the procedures;
- Monitoring, measuring and analysing the procedures for effectiveness; and
- Implementing actions as required based on the results of auditing to ensure continual improvements of the processes.

3.10.3 Personnel

Operation and maintenance of the plant will be undertaken by Grundon staff or subcontractors working on behalf of Grundon. Sufficient numbers of staff, in various grades, will be required to manage, operate and maintain the plant on a continuous basis, seven days per week throughout the year. The plant will be managed, operated and maintained by experienced managers, boiler operators, senior chemists and maintenance staff.

The key environmental management responsibilities will be allocated as follows:

- The General Manager – will have overall responsibility for the management of the plant, and compliance with the operating permit. They will also be responsible for waste management and scheduling. The General Manager will have extensive experience relevant to their responsibilities.
- The Facility Manager - will have day-to-day responsibility for operation of the plant, to ensure it is operated in accordance with the requirements of the permit and that environmental impact of operations is minimised. In this context, they would be responsible for designing and implementing operating procedures which incorporate environmental aspects. They will be responsible for the development and management of the EMS, for the monitoring of authorised releases and for interaction with the Environment Agency.
- The Engineering Manager - will be responsible for the management of maintenance activities, for maintenance planning and for ensuring that the plant continues to operate in accordance with its design.

3.10.4 Competence, Training and Awareness

Grundon aims to ensure that any persons performing tasks for it, or on its behalf, which have the potential to cause significant environmental impact, are competent on the basis of appropriate education and training or experience.

Grundon will develop training procedures to make employees aware of:

- The importance of conformity with the environment policies and procedures and with the requirements of the EMS;
- Potentially significant environmental aspects associated with their work;
- Their roles and responsibilities in achieving conformity with the requirements of the EMS, including emergency preparedness and response requirements;
- The relevance and importance of their activities and how they contribute to the achievement of the environmental and quality objectives; and
- The potential consequences of the departure from specified procedures.

Grundon will ensure that the operation of the Facility will comply with industry standards or codes of practice for training (e.g. WAMITAB or equivalent qualification), where they exist. The EMS will contain an archiving procedure to ensure all training is recorded and all associated records are retained.

3.10.4.1 Competence

Line Managers will identify the minimum competencies required for each role. These will then be applied to the recruitment process to ensure that key role responsibilities are satisfied. Particular attention will be paid to potential candidate's experience, qualifications, knowledge and skills.

3.10.4.2 Induction and Awareness

Staff induction programmes are location and job role specific and will include, as a minimum, the induction of:

- The Environmental Policy;
- The Health and Safety Policy and Procedures; and
- The EMS Awareness Training.

3.10.4.3 Training

Staff training will be completed during commissioning of the Facility and before the plant is operational. Line Managers will identify and monitor staff training needs as part of the appraisal system. The training needs of employees will be addressed using on-the-job training, mentoring, internal training and external training courses/events.

Training records will be maintained onsite. The operation of the Facility will comply with the relevant industry standards or codes of practice for training (e.g. WAMITAB or equivalent qualification), where they exist.

3.11 Closure

3.11.1 Introduction

The Facility is designed for an operational life of more than 25 years, but the actual operational lifetime is dependent on a number of factors including:

- the continued supply of waste; and
- the development of alternative methods competing for the disposal or treatment of the same waste types.

When the Facility has reached the end of its operational life, it may be adapted for an alternative use or demolished as part of a redevelopment scheme and cleared and left in a fit-for-use condition.

3.11.2 Site Closure Plan

At the end of the economic life of the plant, the development site and buildings may be redeveloped for extended use or returned to its current status. The responsibility for this may well rest with other parties if the Facility is sold. However, Grundon recognises the need to ensure that the design, the operation and the maintenance procedures facilitate decommissioning in a safe manner without risk of pollution, contamination or excessive disturbance to noise, dust, odour, groundwater and surface watercourses.

To achieve this aim, a site closure plan will be prepared. It is noted that a Closure Plan will have been previously approved by the EA for the gasification technology. However, due to the changes proposed within this application, this is no longer applicable to the Facility. Therefore, Grundon would propose to submit a site closure plan and submit to the EA for approval prior to the commencement of commissioning of the Facility.

The following is a summary of the measures to be considered within the closure plan to ensure the objective of safe and clean decommissioning.

3.11.2.1 General Requirements

- Underground pipework to be avoided if possible, except for supply and discharge utilities such as towns water, sewerage lines and gas supply;
- Safe removal of all chemical and hazardous materials;
- Adequate provision for drainage, vessel cleaning and dismantling of pipework;
- Disassembly and containment procedures for insulation, materials handling equipment, material extraction equipment, fabric filters and other filtration equipment without significant leakage, spillage, release of dust or other hazardous substance;
- Where practicable, the use of construction material which can be recovered (such as metals);
- Methodology for the removal/decommissioning of components and structures to minimise the exposure of noise, disturbance, dust and odours and for the protection of surface and groundwater;
- Soil and groundwater sampling and testing of sensitive areas to ensure the minimum disturbance (sensitive areas to be selected with reference to the site condition report and any ongoing monitoring undertaken during operation of the Facility).

3.11.2.2 Specific Details

- A list of recyclable materials/components and current potential outlet sources;
- A list of materials/components not suitable for recycling and potential outlet sources;
- A list of materials to go to landfill with current recognised analysis, where appropriate;
- A list of all chemicals and hazardous materials, location and current containment methods; and
- A Bill of Materials detailing total known quantities of items throughout the site such as:
  - Steelwork;
  - Plastics;
  - Cables;
  - Concrete and Civils Materials;
  - Oils;
  - Chemicals;
  - Consumables;
  - Contained water and effluents;
  - Bottom ash; and
  - APCr.

3.11.2.3 Disposal Routes

Each of the items listed within the Bill of Materials will have a recognised or special route for disposal identified; e.g. Landfill by a licensed contractor, disposal by high sided, fully sheeted road vehicle or for sale to a scrap metal dealer, disposal by skip/fully enclosed container, dealer to collect and disposal by container.

3.12 Improvement Programme

Grundon is committed to continual environmental improvement of their operations, and is therefore proposing that a small number of improvement conditions be incorporated into the final EP. These have been set out below. It is understood that the proposed conditions are consistent with EPs which the EA has granted for similar clinical and hazardous waste incineration facilities in England.

3.12.1 Prior to Commissioning

Prior to commencement of commissioning of the Facility, Grundon will comply with the typical Pre-Operational Conditions which will be included for this type of installation, as follows:

- Submit a written report to the EA, on the details of the computational fluid dynamic (CFD) modelling used in the design of the secondary combustion chamber and boiler. The report will demonstrate whether the BAT design stage requirements, given in the sector EPR5.01, have been completed. In particular, the report will demonstrate whether the residence time and temperature requirements will be met.
- Submit a written report to the Environment Agency describing the performance and optimisation of the Selective Non-Catalytic Reduction (SNCR) and the Selective Catalytic Reduction (SCR) systems and combustion settings to minimise oxides of nitrogen (NOx) emissions. The report will also confirm and justify the selection of the reagent to be used within

the SNCR system. This will include provision of procedures for the safe handling and management of the reagent.

- The report will include an assessment of the level of NOx and N_2O emissions that can be achieved under optimum operating conditions.
- Submit to the EA for approval a protocol for the sampling and testing of bottom ash for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.
- Provide a written commissioning plan, including timelines for completion, for approval by the EA. The commissioning plan shall include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the EA in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved.
- Prepare and submit a site closure plan.

3.12.2 Post-Commissioning

On completion of commissioning the Facility, Grundon will comply with the typical Post-Commissioning Conditions which will be included for this type of installation, as follows:

- 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. Results will be submitted to the EA.
- Provide a written proposal to the EA, for carrying out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air, identifying the fractions in the PM_{10} and $PM_{2.5}$ ranges from the Facility. The report will detail a timetable for undertaking the tests and producing a report on the results.
- Submit a written summary report to the EA to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in the EP will comply with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.
- Submit a written report to the EA on the commissioning of the Facility. The report will summarise the environmental performance of the Facility as installed against the design parameters set out in the Application

Appendices

A Plans and Drawings

B Noise Assessment

C Environmental Risk Assessment

D Air Quality Assessment

E BAT Assessment

F Fire Prevention Plan

G Planning Application and Permission

H EWC Codes

Code	Description of waste
1	**WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING, AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS**
01 01	*wastes from mineral metalliferous excavation*
01 01 01	wastes from mineral metalliferous excavation
01 01 02	wastes from mineral non-metalliferous excavation
01 03	*wastes from physical and chemical processing of metalliferous minerals*
01 03 05*	other tailings containing dangerous substances
01 03 07*	other wastes containing dangerous substances from physical and chemical processing of metalliferous minerals
01 03 08	dusty and powdery wastes other than those mentioned in 01 03 07 which require thermal treatment (e.g., due to contaminants being present or that are not suitable for disposal in a landfill)
01 03 09	red mud from alumina production other than the wastes mentioned in 01 03 07
01 03 10	red mud from alumina production containing hazardous substances other than the wastes mentioned in 01 03 07
01 04	*wastes from physical and chemical processing of non-metalliferous minerals*
01 04 07*	wastes containing dangerous substances from physical and chemical processing of non-metalliferous minerals
01 04 08	waste gravel and crushed rocks other than those mentioned in 01 04 07
01 04 09	waste sand and clays
01 04 10	dusty and powdery wastes other than those mentioned in 01 04 07 which require thermal treatment (e.g., due to contaminants being present or that are not suitable for disposal in a landfill)
01 04 11	wastes from potash and rock salt processing other than those mentioned in 01 04 07 which require thermal treatment (e.g., due to contaminants being present or that are not suitable for disposal in a landfill)
01 04 12	tailings and other wastes from washing and cleaning of minerals other than those mentioned in 01 04 07 and 01 04 11
01 04 13	wastes from stone cutting and sawing other than those mentioned in 01 04 07
01 05	*drilling muds and other drilling wastes*
01 05 04	Freshwater drilling muds and wastes
01 05 05*	Oil-containing drilling muds and wastes
01 05 06*	drilling muds and other drilling wastes containing dangerous substances
01 05 07	barite-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06
01 05 08	chloride-containing drilling muds and wastes other than those mentioned in 01 05 05 and 01 05 06
2	**WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING**

Code	Description of waste
02 01	*wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing*
02 01 01	sludges from washing and cleaning that are not suitable for processing in an alternative waste management facility due to contamination
02 01 02	animal-tissue waste which requires high temperature incineration
02 01 03	plant-tissue waste which requires high temperature incineration
02 01 04	waste plastics (except packaging) that are not suitable for processing in an alternative waste management facility due to contamination
02 01 06	animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site which requires high temperature incineration
02 01 07	wastes from forestry which requires high temperature incineration
02 01 08*	agrochemical waste containing dangerous substances
02 01 09	agrochemical waste other than those mentioned in 02 01 08 which requires high temperature incineration
02 01 10	waste metal that is not suitable for processing in an alternative waste management facility due to contamination
02 02	*wastes from the preparation and processing of meat, fish and other foods of animal origin*
02 02 01	sludges from washing and cleaning that are not suitable for processing in an alternative waste management facility due to contamination
02 02 02	animal-tissue waste which requires high temperature incineration
02 02 03	materials unsuitable for consumption or processing that are not suitable for processing in an alternative waste management facility due to contamination
02 02 04	sludges from on-site effluent treatment that are not suitable for processing in an alternative waste management facility due to contamination
02 03	*wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation*
02 03 01	sludges from washing, cleaning, peeling, centrifuging and separation that are not suitable for processing in an alternative waste management facility due to contamination
02 03 02	wastes from preserving agents that are not suitable for processing in an alternative waste management facility due to contamination
02 03 03	wastes from solvent extraction that are not suitable for processing in an alternative waste management facility due to contamination
02 03 04	materials unsuitable for consumption or processing that are not suitable for processing in an alternative waste management facility due to contamination
02 03 05	sludges from on-site effluent treatment that are not suitable for processing in an alternative waste management facility due to contamination
02 04	*wastes from sugar processing*
02 04 01	soil from cleaning and washing beet that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
02 04 02	off-specification calcium carbonate that is not suitable for processing in an alternative waste management facility due to contamination
02 04 03	sludges from on-site effluent treatment that are not suitable for processing in an alternative waste management facility due to contamination
02 05	*wastes from the dairy products industry*
02 05 01	materials unsuitable for consumption or processing which require high temperature incineration
02 05 02	sludges from on-site effluent treatment that are not suitable for processing in an alternative waste management facility due to contamination
02 06	*wastes from the baking and confectionery industry*
02 06 01	materials unsuitable for consumption or processing which require high temperature incineration
02 06 02	wastes from preserving agents that are not suitable for processing in an alternative waste management facility due to contamination
02 06 03	sludges from on-site effluent treatment that are not suitable for processing in an alternative waste management facility due to contamination
02 07	*wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa)*
02 07 01	wastes from washing, cleaning and mechanical reduction of raw materials that are not suitable for processing in an alternative waste management facility due to contamination
02 07 02	wastes from spirits distillation that are not suitable for processing in an alternative waste management facility due to contamination
02 07 03	wastes from chemical treatment that are not suitable for processing in an alternative waste management facility due to contamination
02 07 04	materials unsuitable for consumption or processing that are not suitable for processing in an alternative waste management facility due to contamination
02 07 05	sludges from on-site effluent treatment that are not suitable for processing in an alternative waste management facility due to contamination
3	**WASTES FROM WOOD PROCESSING AND THE PRODUCTION OF PANELS AND FURNITURE, PULP, PAPER AND CARDBOARD**
03 01	*wastes from wood processing and the production of panels and furniture*
03 01 01	waste bark and cork that is not suitable for processing in an alternative waste management facility due to contamination
03 01 04*	sawdust, shavings, cuttings, wood, particle board and veneer containing dangerous substances
03 01 05	sawdust, shavings, cuttings, wood, particle board and veneer other than those mentioned in 03 01 04 that are not suitable for processing in an alternative waste management facility due to contamination
03 02	*wastes from wood preservation*
03 02 01*	non-halogenated organic wood preservatives
03 02 02*	organochlorinated wood preservatives

Code	Description of waste
03 02 03*	organometallic wood preservatives
03 02 04*	inorganic wood preservatives
03 02 05*	other wood preservatives containing dangerous substances
03 03	*wastes from pulp, paper and cardboard production and processing*
03 03 01	waste bark and wood that is not suitable for processing in an alternative waste management facility due to contamination
03 03 02	green liquor sludge (from recovery of cooking liquor) that is not suitable for processing in an alternative waste management facility due to contamination
03 03 05	de-inking sludges from paper recycling that are not suitable for processing in an alternative waste management facility due to contamination
03 03 07	mechanically separated rejects from pulping of waste paper and cardboard that are not suitable for processing in an alternative waste management facility due to contamination
03 03 08	wastes from sorting of paper and cardboard destined for recycling that are not suitable for processing in an alternative waste management facility due to contamination
03 03 09	lime mud waste that is not suitable for processing in an alternative waste management facility due to contamination
03 03 10	fibre rejects, fibre-, filler- and coating-sludges from mechanical separation that is not suitable for processing in an alternative waste management facility due to contamination
03 03 11	sludges from on-site effluent treatment other than those mentioned in 03 03 10 that are not suitable for processing in an alternative waste management facility due to contamination
4	**WASTES FROM THE LEATHER, FUR AND TEXTILE INDUSTRIES**
04 01	*wastes from the leather and fur industry*
04 01 01	fleshings and lime split wastes that are not suitable for processing in an alternative waste management facility due to contamination
04 01 02	liming waste that is not suitable for processing in an alternative waste management facility due to contamination
04 01 03*	degreasing wastes containing solvents without a liquid phase
04 01 04	tanning liquor containing chromium that is not suitable for processing in an alternative waste management facility due to contamination
04 01 05	tanning liquor free of chromium that is not suitable for processing in an alternative waste management facility due to contamination
04 01 06	sludges, in particular from on-site effluent treatment containing chromium that are not suitable for processing in an alternative waste management facility due to contamination
04 01 07	sludges, in particular from on-site effluent treatment free of chromium that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
04 01 08	waste tanned leather (blue sheeting's, shavings, cuttings, buffing dust) containing chromium that is not suitable for processing in an alternative waste management facility due to contamination
04 01 09	wastes from dressing and finishing that is not suitable for processing in an alternative waste management facility due to contamination
04 02	*wastes from the textile industry*
04 02 09	wastes from composite materials (impregnated textile, elastomer, plastomer) that are not suitable for processing in an alternative waste management facility due to contamination
04 02 10	organic matter from natural products (for example grease, wax) that is not suitable for processing in an alternative waste management facility due to contamination
04 02 14*	wastes from finishing containing organic solvents
04 02 15	wastes from finishing other than those mentioned in 04 02 14 that are not suitable for processing in an alternative waste management facility due to contamination
04 02 16*	dyestuffs and pigments containing dangerous substances
04 02 17	dyestuffs and pigments other than those mentioned in 04 02 16 that are not suitable for processing in an alternative waste management facility due to contamination
04 02 19*	sludges from on-site effluent treatment containing dangerous substances
04 02 20	Sludges from on-site effluent treatment other than those mentioned in 04 02 19 that are not suitable for processing in an alternative waste management facility due to contamination
04 02 21	wastes from unprocessed textile fibres that are not suitable for processing in an alternative waste management facility due to contamination
04 02 22	wastes from processed textile fibres that are not suitable for processing in an alternative waste management facility due to contamination
5	**WASTES FROM PETROLEUM REFINING, NATURAL GAS PURIFICATION AND PYROLYTIC TREATMENT OF COAL**
05 01	*wastes from petroleum refining*
05 01 02*	desalter sludges
05 01 03*	tank bottom sludges
05 01 04*	acid alkyl sludges
05 01 05*	oil spills
05 01 06*	oily sludges from maintenance operations of the plant or equipment
05 01 07*	acid tars
05 01 08*	other tars
05 01 09*	sludges from on-site effluent treatment containing dangerous substances
05 01 10	Sludges from on-site effluent treatment other than those mentioned in 05 01 09 that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
05 01 11*	wastes from cleaning of wastes with bases
05 01 12*	oil containing acids
05 01 13	boiler feedwater sludges that are not suitable for processing in an alternative waste management facility due to contamination
05 01 14	wastes from cooling columns that are not suitable for processing in an alternative waste management facility due to contamination
05 01 15*	spent filter clays
05 01 17	bitumen that requires high temperature incineration
05 06	*wastes from the pyrolytic treatment of coal*
05 06 01*	acid tars
05 06 03*	other tars
05 06 04	waste from cooling columns that are not suitable for processing in an alternative waste management facility due to contamination
6	**WASTES FROM INORGANIC CHEMICAL PROCESSES**
06 01	*wastes from the manufacture, formulation, supply and use (MFSU) of acids*
06 01 01*	sulphuric acid and sulphurous acid
06 01 02*	hydrochloric acid
06 01 03*	hydrofluoric acid
06 01 04*	phosphoric and phosphorous acid
06 01 05*	nitric acid and nitrous acid
06 01 06*	other acids
06 02	*wastes from the MFSU of bases*
06 02 01*	calcium hydroxide
06 02 03*	ammonium hydroxide
06 02 04*	sodium and potassium hydroxide
06 02 05*	other bases
06 03	*wastes from the MFSU of salts and their solutions and metallic oxides*
06 03 11*	solid salts and solutions containing cyanides
06 03 13*	solid salts and solutions containing heavy metals
06 03 14	solid salts and solutions other than those mentioned in 06 03 11 and 06 03 13
06 03 15*	metallic oxides containing heavy metals
06 03 16	metallic oxides other than those mentioned in 06 03 15
06 04	*metal-containing wastes other than those mentioned in 06 03*
06 04 03*	wastes containing arsenic
06 04 05*	wastes containing other heavy metals
06 05	*Sludges from on-site effluent treatment*
06 05 02*	sludges from on-site effluent treatment containing dangerous substances

Code	Description of waste
06 05 03	sludges from on-site effluent treatment other than those mentioned in 06 05 02 that are not suitable for processing in an alternative waste management facility due to contamination
06 07	*wastes from the MFSU of halogens and halogen chemical processes*
06 08	*wastes from the MFSU of silicon and silicon derivatives*
06 08 02*	wastes containing chlorosilanes
06 09	*wastes from the MSFU of phosphorous chemicals and phosphorous chemical processes*
06 09 03*	calcium-based reaction wastes containing or contaminated with dangerous substances
06 09 04	calcium-based reaction wastes other than those mentioned in 06 09 03
06 10	*wastes from the MFSU of nitrogen chemicals, nitrogen chemical processes and fertiliser manufacture*
06 10 02*	wastes containing dangerous substances
06 11	*wastes from the manufacture of inorganic pigments and opacificiers*
06 11 01	calcium-based reaction wastes from titanium dioxide production
06 13	*wastes from inorganic chemical processes not otherwise specified*
06 13 01*	inorganic plant protection products, wood-preserving agents and other biocides.
06 13 02*	spent activated carbon (except 06 07 02)
06 13 03	carbon black
06 13 04*	wastes from asbestos processing
06 13 05*	soot
7	**WASTES FROM ORGANIC CHEMICAL PROCESSES**
07 01	*wastes from the manufacture, formulation, supply and use (MFSU) of basic organic chemicals*
07 01 01*	aqueous washing liquids and mother liquors
07 01 03*	organic halogenated solvents, washing liquids and mother liquors
07 01 04*	other organic solvents, washing liquids and mother liquors
07 01 07*	halogenated still bottoms and reaction residues
07 01 08*	other still bottoms and reaction residues
07 01 09*	halogenated filter cakes and spent absorbents
07 01 10*	other filter cakes and spent absorbents
07 01 11*	sludges from on-site effluent treatment containing dangerous substances
07 01 12	sludges from on-site effluent treatment other than those mentioned in 07 01 11 that are not suitable for processing in an alternative waste management facility due to contamination
07 02	*wastes from the MFSU of plastics, synthetic rubber and man-made fibres*
07 02 01*	aqueous washing liquids and mother liquors

Code	Description of waste
07 02 03*	organic halogenated solvents, washing liquids and mother liquors
07 02 04*	other organic solvents, washing liquids and mother liquors
07 02 07*	halogenated still bottoms and reaction residues
07 02 08*	other still bottoms and reaction residues
07 02 09*	halogenated filter cakes and spent absorbents
07 02 10*	other filter cakes and spent absorbents
07 02 11*	sludges from on-site effluent treatment containing dangerous substances
07 02 12	sludges from on-site effluent treatment other than those mentioned in 07 02 11 that are not suitable for processing in an alternative waste management facility due to contamination
07 02 13	waste plastic that is not suitable for processing in an alternative waste management facility due to contamination
07 02 14*	wastes from additives containing dangerous substances
07 02 15	wastes from additives other than those mentioned in 07 02 14 that are not suitable for processing in an alternative waste management facility due to contamination
07 02 16	wastes containing silicones that are not suitable for processing in an alternative waste management facility due to contamination
07 02 17	Waste containing silicones other than those mentioned in 07 02 16 that are not suitable for processing in an alternative waste management facility due to contamination
07 03	*wastes from the MFSU of organic dyes and pigments (except 06 11)*
07 03 01*	aqueous washing liquids and mother liquors
07 03 03*	organic halogenated solvents, washing liquids and mother liquors
07 03 04*	other organic solvents, washing liquids and mother liquors
07 03 07*	halogenated still bottoms and reaction residues
07 03 08*	other still bottoms and reaction residues
07 03 09*	halogenated filter cakes and spent absorbents
07 03 10*	other filter cakes and spent absorbents
07 03 11*	sludges from on-site effluent treatment containing dangerous substances
07 03 12	sludges from on-site effluent treatment other than those mentioned in 07 03 11 that are not suitable for processing in an alternative waste management facility due to contamination
07 04	*wastes from the MFSU of organic plant protection products (except 02 01 08 and 02 01 09), wood preserving agents (except 03 02) and other biocides*
07 04 01*	aqueous washing liquids and mother liquors
07 04 03*	organic halogenated solvents, washing liquids and mother liquors
07 04 04*	other organic solvents, washing liquids and mother liquors
07 04 07*	halogenated still bottoms and reaction residues
07 04 08*	other still bottoms and reaction residues

Code	Description of waste
07 04 09*	halogenated filter cakes and spent absorbents
07 04 10*	other filter cakes and spent absorbents
07 04 11*	sludges from on-site effluent treatment containing dangerous substances
07 04 12	sludges from on-site effluent treatment other than those mentioned in 07 04 11
07 04 13*	solid wastes containing dangerous substances
07 05	*wastes from the MFSU of pharmaceuticals*
07 05 01*	aqueous washing liquids and mother liquors
07 05 03*	organic halogenated solvents, washing liquids and mother liquors
07 05 04*	other organic solvents, washing liquids and mother liquors
07 05 07*	halogenated still bottoms and reaction residues
07 05 08*	other still bottoms and reaction residues
07 05 09*	halogenated filter cakes and spent absorbents
07 05 10*	other filter cakes and spent absorbents
07 05 11*	sludges from on-site effluent treatment containing dangerous substances
07 05 12	sludges from on-site effluent treatment other than those mentioned in 07 05 11 that are not suitable for processing in an alternative waste management facility due to contamination
07 05 13*	solid wastes containing dangerous substances
07 05 14	solid wastes other than those mentioned in 07 05 13 that are not suitable for processing in an alternative waste management facility due to contamination
07 06	*wastes from the MFSU of fats, grease, soaps, detergents, disinfectants and cosmetics*
07 06 01*	aqueous washing liquids and mother liquors
07 06 03*	organic halogenated solvents, washing liquids and mother liquors
07 06 04*	other organic solvents, washing liquids and mother liquors
07 06 07*	halogenated still bottoms and reaction residues
07 06 08*	other still bottoms and reaction residues
07 06 09*	halogenated filter cakes and spent absorbents
07 06 10*	other filter cakes and spent absorbents
07 06 11*	sludges from on-site effluent treatment containing dangerous substances
07 06 12	sludges from on-site effluent treatment other than those mentioned in 07 06 11 that are not suitable for processing in an alternative waste management facility due to contamination
07 07	*wastes from the MFSU of fine chemicals and chemical products not otherwise specified*
07 07 01*	aqueous washing liquids and mother liquors
07 07 03*	organic halogenated solvents, washing liquids and mother liquors
07 07 04*	other organic solvents, washing liquids and mother liquors
07 07 07*	halogenated still bottoms and reaction residues

Code	Description of waste
07 07 08*	other still bottoms and reaction residues
07 07 09*	halogenated filter cakes and spent absorbents
07 07 10*	other filter cakes and spent absorbents
07 07 11*	sludges from on-site effluent treatment containing dangerous substances
07 07 12	sludges from on-site effluent treatment other than those mentioned in 07 07 11 that are not suitable for processing in an alternative waste management facility due to contamination
8	**WASTES FROM THE MANUFACTURE, FORMULATION, SUPPLY AND USE (MFSU) OF COATINGS (PAINTS, VARNISHES AND VITREOUS ENAMELS), ADHESIVES, SEALANTS AND PRINTING INKS**
08 01	*wastes from MFSU and removal of paint and varnish*
08 01 11*	waste paint and varnish containing organic solvents or other dangerous substances
08 01 12	waste paint and varnish other than those mentioned in 08 01 11 that are not suitable for processing in an alternative waste management facility due to contamination
08 01 13*	sludges from paint or varnish containing organic solvents or other dangerous substances
08 01 14	sludges from paint or varnish other than those mentioned in 08 01 13 that are not suitable for processing in an alternative waste management facility due to contamination
08 01 15*	aqueous sludges containing paint or varnish containing organic solvents or other dangerous substances
08 01 16	aqueous sludges containing paint or varnish other than those mentioned in 08 01 15 that are not suitable for processing in an alternative waste management facility due to contamination
08 01 17*	wastes from paint or varnish removal containing organic solvents or other dangerous substances
08 01 18	wastes from paint or varnish removal other than those mentioned in 08 01 17 that are not suitable for processing in an alternative waste management facility due to contamination
08 01 19*	aqueous suspensions containing paint or varnish containing organic solvents or other dangerous substances
08 01 20	aqueous suspensions containing paint or varnish other than those mentioned in 08 01 19 that are not suitable for processing in an alternative waste management facility due to contamination
08 01 21*	waste paint or varnish remover
08 02	*wastes from MFSU of other coatings (including ceramic materials)*
08 02 01	waste coating powders which require thermal treatment (e.g., due to contaminants being present or that are not suitable for disposal in a landfill)
08 02 02	aqueous sludges containing ceramic materials that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
08 02 03	aqueous suspensions containing ceramic materials that are not suitable for processing in an alternative waste management facility due to contamination
08 03	*wastes from MFSU of printing inks*
08 03 07	aqueous sludges containing ink that are not suitable for processing in an alternative waste management facility due to contamination
08 03 08	aqueous liquid waste containing ink that requires high temperature incineration
08 03 12*	waste ink containing dangerous substances
08 03 13	waste ink other than those mentioned in 08 03 12 that requires high temperature incineration
08 03 14*	ink sludges containing dangerous substances
08 03 15	ink sludges other than those mentioned in 08 03 14 that are not suitable for processing in an alternative waste management facility due to contamination
08 03 16*	waste etching solutions
08 03 17*	waste printing toner containing dangerous substances
08 03 18	waste printing toner other than those mentioned in 08 03 17 that requires high temperature incineration
08 03 19*	disperse oil
08 04	*wastes from MFSU of adhesives and sealants (including waterproofing products)*
08 04 09*	waste adhesives and sealants containing organic solvents or other dangerous substances
08 04 10	waste adhesives and sealants other than those mentioned in 08 04 09 that are not suitable for processing in an alternative waste management facility due to contamination
08 04 11*	adhesive and sealant sludges containing organic solvents or other dangerous substances
08 04 12	adhesive and sealant sludges other than those mentioned in 08 04 11 that are not suitable for processing in an alternative waste management facility due to contamination
08 04 13*	aqueous sludges containing adhesives or sealants containing organic solvents or other dangerous substances
08 04 14	aqueous sludges containing adhesives or sealants other than those mentioned in 08 04 13 that are not suitable for processing in an alternative waste management facility due to contamination
08 04 15*	aqueous liquid waste containing adhesives or sealants containing organic solvents or other dangerous substances
08 04 16	aqueous liquid waste containing adhesives or sealants other than those mentioned in 08 04 15 that are not suitable for processing in an alternative waste management facility due to contamination
08 04 17*	rosin oil
08 05	wastes not otherwise specified in 08
08 05 01*	waste isocyanates

Code	Description of waste
9	**WASTES FROM THE PHOTOGRAPHIC INDUSTRY**
09 01	*wastes from the photographic industry*
09 01 01*	water-based developer and activator solutions
09 01 02*	water-based offset plate developer solutions
09 01 03*	solvent-based developer solutions
09 01 04*	fixer solutions
09 01 05*	bleach solutions and bleach fixer solutions
09 01 06*	wastes containing silver from on-site treatment of photographic wastes
09 01 07	photographic film and paper containing silver or silver compounds that requires high temperature incineration
09 01 08	photographic film and paper free of silver or silver compounds that requires high temperature incineration
09 01 10	single-use cameras without batteries that requires high temperature incineration
09 01 11*	single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03
09 01 12	single-use cameras containing batteries other than those mentioned in 09 01 11 that requires high temperature incineration
09 01 13*	aqueous liquid waste from on-site reclamation of silver other than those mentioned in 09 01 06
10	**WASTES FROM THERMAL PROCESSES**
10 01	*wastes from power stations and other combustion plants (except 19)*
10 01 01	bottom ash, slag and boiler dust (excluding boiler dust mentioned in 10 01 04)
10 01 04*	oil fly ash and boiler dust
10 01 14*	bottom ash, slag and boiler dust from co-incineration containing dangerous substances
10 01 16*	fly ash from co-incineration containing dangerous substances
10 01 18*	wastes from gas cleaning containing dangerous substances
10 01 20*	sludges from on-site effluent treatment containing dangerous substances
10 01 21	sludges from on-site effluent treatment other than those mentioned in 10 01 20 that are not suitable for processing in an alternative waste management facility due to contamination
10 01 22*	aqueous sludges from boiler cleansing containing dangerous substances
10 01 23	aqueous sludges from boiler cleansing other than those mentioned in 10 01 22 that are not suitable for processing in an alternative waste management facility due to contamination
10 02	*wastes from the iron and steel industry*
10 02 01	wastes from the processing of slag that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
10 02 02	unprocessed slag that is not suitable for processing in an alternative waste management facility due to contamination
10 02 07*	solid wastes from gas treatment containing dangerous substances
10 02 10	mill scales that are not suitable for processing in an alternative waste management facility due to contamination
10 02 11*	wastes from cooling-water treatment containing oil
10 02 12	wastes from cooling-water treatment other than those mentioned in 10 02 11 that are not suitable for processing in an alternative waste management facility due to contamination
10 02 13*	sludges and filter cakes from gas treatment containing dangerous substances
10 02 14	sludges and filter cakes from gas treatment other than those mentioned in 10 02 13 that are not suitable for processing in an alternative waste management facility due to contamination
10 02 15	other sludges and filter cakes that are not suitable for processing in an alternative waste management facility due to contamination
10 03	*wastes from aluminium thermal metallurgy*
10 03 04*	primary production slags
10 03 15*	skimmings that are flammable or emit, upon contact with water, flammable gases in dangerous quantities
10 03 17*	tar-containing wastes from anode manufacture
10 03 19*	flue-gas dust containing dangerous substances
10 03 21*	other particulates and dust (including ball-mill dust) containing dangerous substances
10 03 23*	solid wastes from gas treatment containing dangerous substances
10 03 25*	sludges and filter cakes from gas treatment containing dangerous substances
10 03 27*	wastes from cooling-water treatment containing oil
10 03 29*	wastes from treatment of salt slags and black drosses containing dangerous substances
10 08	*wastes from other non-ferrous thermal metallurgy*
10 08 12*	tar-containing wastes from anode manufacture
10 08 15*	flue-gas dust containing dangerous substances
10 08 17*	sludges and filter cakes from flue-gas treatment containing dangerous substances
10 08 18	sludges and filter cakes from flue-gas treatment other than those mentioned in 10 08 17 that are not suitable for processing in an alternative waste management facility due to contamination
10 08 19*	wastes from cooling-water treatment containing oil
10 08 20	wastes from cooling-water treatment other than those mentioned in 10 08 19 that are not suitable for processing in an alternative waste management facility due to contamination
10 09	*wastes from casting of ferrous pieces*

Code	Description of waste
10 09 05*	casting cores and moulds which have not undergone pouring containing dangerous substances
10 09 07*	casting cores and moulds which have undergone pouring containing dangerous substances
10 09 11*	other particulates containing dangerous substances
10 09 13*	waste binders containing dangerous substances
10 09 14	waste binders other than those mentioned in 10 09 13
10 09 15*	waste crack-indicating agent containing dangerous substances
10 09 16	waste crack-indicating agent other than those mentioned in 10 09 15 that are not suitable for processing in an alternative waste management facility due to contamination
10 10	*wastes from casting of non-ferrous pieces*
10 10 05*	casting cores and moulds which have not undergone pouring, containing dangerous substances
10 10 07*	casting cores and moulds which have undergone pouring, containing dangerous substances
10 10 09*	flue-gas dust containing dangerous substances
10 10 11*	other particulates containing dangerous substances
10 10 13*	waste binders containing dangerous substances
10 10 14	waste binders other than those mentioned in 10 10 13
10 10 15*	waste crack-indicating agent containing dangerous substances
10 10 16	waste crack-indicating agent other than those mentioned in 10 10 15 that are not suitable for processing in an alternative waste management facility due to contamination
10 11	*wastes from manufacture of glass and glass products*
10 11 09*	waste preparation mixture before thermal processing, containing dangerous substances
10 11 13*	glass-polishing and -grinding sludge containing dangerous substances
10 11 15*	solid wastes from flue-gas treatment containing dangerous substances
10 11 17*	sludges and filter cakes from flue-gas treatment containing dangerous substances
10 11 19*	solid wastes from on-site effluent treatment containing dangerous substances
11	**WASTES FROM CHEMICAL SURFACE TREATMENT AND COATING OF METALS AND OTHER MATERIALS; NON-FERROUS HYDRO-METALLURGY**
11 01	*wastes from chemical surface treatment and coating of metals and other materials (for example galvanic processes, zinc coating processes, pickling processes, etching, phosphating, alkaline degreasing, anodising)*
11 01 05*	pickling acids
11 01 06*	acids not otherwise specified
11 01 07*	pickling bases

Code	Description of waste
11 01 08*	phosphatising sludges
11 01 09*	sludges and filter cakes containing dangerous substances
11 01 10	sludges and filter cakes other than those mentioned in 11 01 09 that are not suitable for processing in an alternative waste management facility due to contamination
11 01 11*	aqueous rinsing liquids containing dangerous substances
11 01 12	aqueous rinsing liquids other than those mentioned in 11 01 11 that are not suitable for processing in an alternative waste management facility due to contamination
11 01 13*	degreasing wastes containing dangerous substances
11 01 14	degreasing wastes other than those mentioned in 11 01 13 that requires high temperature incineration
11 01 15*	eluate and sludges from membrane systems or ion exchange systems containing dangerous substances
11 01 16*	saturated or spent ion exchange resins
11 01 98*	other wastes containing dangerous substances
11 02	*wastes from non-ferrous hydrometallurgical processes*
11 02 02*	sludges from zinc hydrometallurgy (including jarosite, goethite)
11 02 03	wastes from the production of anodes for aqueous electrolytical processes that are not suitable for processing in an alternative waste management facility due to contamination
11 02 05*	wastes from copper hydrometallurgical processes containing dangerous substances
11 02 06	wastes from copper hydrometallurgical processes other than those mentioned in 11 02 05 that are not suitable for processing in an alternative waste management facility due to contamination
11 02 07*	other wastes containing dangerous substances
11 03	*sludges and solids from tempering processes*
11 03 01*	wastes containing cyanide
11 03 02*	other wastes
12	**WASTES FROM SHAPING AND PHYSICAL AND MECHANICAL SURFACE TREATMENT OF METALS AND PLASTICS**
12 01	*wastes from shaping and physical and mechanical surface treatment of metals and plastics*
12 01 01	ferrous metal filings and turnings that are not suitable for processing in an alternative waste management facility due to contamination
12 01 02	ferrous metal dust and particles that are not suitable for processing in an alternative waste management facility due to contamination
12 01 03	non-ferrous metal filings and turnings that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
12 01 04	non-ferrous metal dust and particles that are not suitable for processing in an alternative waste management facility due to contamination
12 01 05	plastics shavings and turnings that are not suitable for processing in an alternative waste management facility due to contamination
12 01 06*	mineral-based machining oils containing halogens (except emulsions and solutions)
12 01 07*	mineral-based machining oils free of halogens (except emulsions and solutions)
12 01 08*	machining emulsions and solutions containing halogens
12 01 09*	machining emulsions and solutions free of halogens
12 01 10*	synthetic machining oils
12 01 12*	spent waxes and fats
12 01 13	welding wastes that are not suitable for processing in an alternative waste management facility due to contamination
12 01 14*	machining sludges containing dangerous substances
12 01 15	machining sludges other than those mentioned in 12 01 14 that are not suitable for processing in an alternative waste management facility due to contamination
12 01 16*	waste blasting material containing dangerous substances
12 01 17	waste blasting material other than those mentioned in 12 01 16 that is not suitable for processing in an alternative waste management facility due to contamination
12 01 18*	metal sludge (grinding, honing and lapping sludge) containing oil
12 01 19*	readily biodegradable machining oil
12 01 20*	spent grinding bodies and grinding materials containing dangerous substances
12 01 21	spent grinding bodies and grinding materials other than those mentioned in 12 01 20 that are not suitable for processing in an alternative waste management facility due to contamination
12 03	*wastes from water and steam degreasing processes (except 11)*
12 03 01*	aqueous washing liquids
12 03 02*	steam degreasing wastes
13	**OIL WASTES AND WASTES OF LIQUID WASTES (except edible oils, and those in chapters 05, 12 and 19)**
13 01	*waste hydraulic oils*
13 01 01*	hydraulic oils, containing PCBs (1)
13 01 04*	chlorinated emulsions
13 01 05*	non-chlorinated emulsions
13 01 09*	mineral-based chlorinated hydraulic oils
13 01 10*	mineral based non-chlorinated hydraulic oils
13 01 11*	synthetic hydraulic oils
13 01 12*	readily biodegradable hydraulic oils
13 01 13*	other hydraulic oils

Code	Description of waste
13 02	*waste engine, gear and lubricating oils*
13 02 04*	mineral-based chlorinated engine, gear and lubricating oils
13 02 05*	mineral-based non-chlorinated engine, gear and lubricating oils
13 02 06*	synthetic engine, gear and lubricating oils
13 02 07*	readily biodegradable engine, gear and lubricating oils
13 02 08*	other engine, gear and lubricating oils
13 03	*waste insulating and heat transmission oils*
13 03 01*	insulating or heat transmission oils containing PCBs
13 03 06*	mineral-based chlorinated insulating and heat transmission oils other than those mentioned in 13 03 01
13 03 07*	mineral-based non-chlorinated insulating and heat transmission oils
13 03 08*	synthetic insulating and heat transmission oils
13 03 09*	readily biodegradable insulating and heat transmission oils
13 03 10*	other insulating and heat transmission oils
13 04	*bilge oils*
13 04 01*	bilge oils from inland navigation
13 04 02*	bilge oils from jetty sewers
13 04 03*	bilge oils from other navigation
13 05	*oil/water separator contents*
13 05 01*	solids from grit chambers and oil/water separators
13 05 02*	sludges from oil/water separators
13 05 03*	interceptor sludges
13 05 06*	oil from oil/water separators
13 05 07*	oily water from oil/water separators
13 05 08*	mixtures of wastes from grit chambers and oil/water separators
13 07	*wastes of liquid wastes*
13 07 01*	waste oil and diesel
13 07 02*	petrol
13 07 03*	other wastes (including mixtures)
13 08	*oil wastes not otherwise specified*
13 08 01*	desalter sludges or emulsions
13 08 02*	other emulsions
14	**WASTE ORGANIC SOLVENTS, REFRIGERANTS AND PROPELLANTS (except 07 and 08)**
14 06	*waste organic solvents, refrigerants and foam/aerosol propellants*
14 06 01*	chlorofluorocarbons, HCFC, HFC
14 06 02*	other halogenated solvents and solvent mixtures
14 06 03*	other solvents and solvent mixtures

Code	Description of waste
14 06 04*	sludges or solid wastes containing halogenated solvents
14 06 05*	sludges or solid wastes containing other solvents
15	**WASTE PACKAGING; ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED**
15 01	*packaging (including separately collected municipal packaging waste)*
15 01 01	paper and cardboard packaging
15 01 02	plastic packaging
15 01 03	wooden packaging
15 01 04	metallic packaging
15 01 05	composite packaging
15 01 06	mixed packaging
15 01 07	glass packaging
15 01 09	textile packaging
15 01 10*	packaging containing residues of or contaminated by dangerous substances
15 01 11*	metallic packaging containing a dangerous solid porous matrix (for example asbestos), including empty pressure containers
15 02	*absorbents, filter materials, wiping cloths and protective clothing*
15 02 02*	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances
15 02 03	absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02 that are not suitable for processing in an alternative waste management facility due to contamination
16	**WASTES NOT OTHERWISE SPECIFIED IN THE LIST**
16 01	*end-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance (except 13, 14, 16 06 and 16 08)*
16 01 03	end-of-life tyres that are not suitable for processing in an alternative waste management facility due to contamination
16 01 07*	oil filters
16 01 09*	components containing PCBs
16 01 10*	explosive components (for example air bags)
16 01 11*	brake pads containing asbestos
16 01 12	brake pads other than those mentioned in 16 01 11 that are not suitable for processing in an alternative waste management facility due to contamination
16 01 13*	brake fluids
16 01 14*	antifreeze fluids containing dangerous substances
16 01 15	antifreeze fluids other than those mentioned in 16 01 14 that are not suitable for processing in an alternative waste management facility due to contamination
16 01 17	ferrous metal that is not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
16 01 18	non-ferrous metal that is not suitable for processing in an alternative waste management facility due to contamination
16 01 19	plastic that is not suitable for processing in an alternative waste management facility due to contamination
16 01 20	glass that is not suitable for processing in an alternative waste management facility due to contamination
16 01 21*	hazardous components other than those mentioned in 16 01 07 to 16 01 11 and 16 01 13 and 16 01 14
16 01 22	components not otherwise specified that is not suitable for processing in an alternative waste management facility due to contamination
16 02	*wastes from electrical and electronic equipment*
16 02 09*	transformers and capacitors containing PCBs
16 02 10*	discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09
16 02 11*	discarded equipment containing chlorofluorocarbons, HCFC, HFC
16 02 12*	discarded equipment containing free asbestos
16 02 13*	discarded equipment containing hazardous components (2) other than those mentioned in 16 02 09 to 16 02 12
16 02 14	discarded equipment other than those mentioned in 16 02 09 to 16 02 13 that is not suitable for processing in an alternative waste management facility due to contamination
16 02 15*	hazardous components removed from discarded equipment
16 02 16	components removed from discarded equipment other than those mentioned in 16 02 15 that are not suitable for processing in an alternative waste management facility due to contamination
16 03	*off-specification batches and unused products*
16 03 03*	inorganic wastes containing dangerous substances
16 03 04	inorganic wastes other than those mentioned in 16 03 03 that are not suitable for processing in an alternative waste management facility due to contamination
16 03 05*	organic wastes containing dangerous substances
16 03 06	organic wastes other than those mentioned in 16 03 05 that are not suitable for processing in an alternative waste management facility due to contamination
16 04	*waste explosives*
16 04 01*	waste ammunition
16 04 02*	fireworks wastes
16 04 03*	other waste explosives
16 05	*gases in pressure containers and discarded chemicals*
16 05 04*	gases in pressure containers (including halons) containing dangerous substances
16 05 05	gases in pressure containers other than those mentioned in 16 05 04 that require high temperature incineration

Code	Description of waste
16 05 06*	laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals
16 05 07*	discarded inorganic chemicals consisting of or containing dangerous substances
16 05 08*	discarded organic chemicals consisting of or containing dangerous substances
16 05 09	discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08 that are not suitable for processing in an alternative waste management facility due to contamination
16 06	*batteries and accumulators*
16 06 01*	lead batteries
16 06 02*	Ni-Cd batteries
16 06 04	alkaline batteries (except 16 06 03) which require high temperature incineration
16 06 05	other batteries and accumulators which require high temperature incineration
16 06 06*	separately collected electrolyte from batteries and accumulators
16 07	*wastes from transport tank, storage tank and barrel cleaning (except 05 and 13)*
16 07 08*	wastes containing oil
16 07 09*	wastes containing other dangerous substances
16 08	*spent catalysts*
16 08 01	spent catalysts containing gold, silver, rhenium, rhodium, palladium, iridium or platinum (except 16 08 07) that are not suitable for processing in an alternative waste management facility due to contamination
16 08 02*	spent catalysts containing dangerous transition metals (3) or dangerous transition metal compounds
16 08 03	spent catalysts containing transition metals or transition metal compounds not otherwise specified that are not suitable for processing in an alternative waste management facility due to contamination
16 08 04	spent fluid catalytic cracking catalysts (except 16 08 07) that are not suitable for processing in an alternative waste management facility due to contamination
16 08 05*	spent catalysts containing phosphoric acid
16 08 06*	spent liquids used as catalysts
16 08 07*	spent catalysts contaminated with dangerous substances
16 09	*oxidising substances*
16 09 01*	permanganates, for example potassium permanganate
16 09 02*	chromates, for example potassium chromate, potassium or sodium dichromate
16 09 03*	peroxides, for example hydrogen peroxide
16 09 04*	oxidising substances, not otherwise specified
16 10	*aqueous liquid wastes destined for off-site treatment*
16 10 01*	aqueous liquid wastes containing dangerous substances
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01 that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
16 10 03*	aqueous concentrates containing dangerous substances
16 10 04	aqueous concentrates other than those mentioned in 16 10 03 that are not suitable for processing in an alternative waste management facility due to contamination
16 11	*waste linings and refractories*
16 11 01*	carbon-based linings and refractories from metallurgical processes containing dangerous substances
16 11 02	carbon-based linings and refractories from metallurgical processes others than those mentioned in 16 11 01, that are not suitable for processing in an alternative waste management facility due to contamination
16 11 03*	other linings and refractories from metallurgical processes containing dangerous substances
16 11 04	other linings and refractories from metallurgical processes other than those mentioned in 16 11 03 that are not suitable for processing in an alternative waste management facility due to contamination
16 11 05*	linings and refractories from non-metallurgical processes containing dangerous substances
16 11 06	linings and refractories from non-metallurgical processes others than those mentioned in 16 11 05
17	**CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)**
17 01	*concrete, bricks, tiles and ceramics*
17 01 01	concrete that are not suitable for processing in an alternative waste management facility due to contamination
17 01 02	bricks that are not suitable for processing in an alternative waste management facility due to contamination
17 01 03	tiles and ceramics that are not suitable for processing in an alternative waste management facility due to contamination
17 01 06*	mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing dangerous substances
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06 that are not suitable for processing in an alternative waste management facility due to contamination
17 02	*wood, glass and plastic*
17 02 01	wood that is not suitable for processing in an alternative waste management facility due to contamination
17 02 02	glass that is not suitable for processing in an alternative waste management facility due to contamination
17 02 03	plastic that is not suitable for processing in an alternative waste management facility due to contamination
17 02 04*	glass, plastic and wood containing or contaminated with dangerous substances
17 03	*bituminous mixtures, coal tar and tarred products*

Code	Description of waste
17 03 01*	bituminous mixtures containing coal tar
17 03 02	bituminous mixtures other than those mentioned in 17 03 01 which require high temperature incineration
17 03 03*	coal tar and tarred products
17 04	*metals (including their alloys)*
17 04 01	copper, bronze, brass that is not suitable for processing in an alternative waste management facility due to contamination
17 04 02	aluminium that is not suitable for processing in an alternative waste management facility due to contamination
17 04 03	lead that is not suitable for processing in an alternative waste management facility due to contamination
17 04 04	zinc that is not suitable for processing in an alternative waste management facility due to contamination
17 04 05	iron and steel that are not suitable for processing in an alternative waste management facility due to contamination
17 04 06	tin that is not suitable for processing in an alternative waste management facility due to contamination
17 04 07	mixed metals that are not suitable for processing in an alternative waste management facility due to contamination
17 04 09*	metal waste contaminated with dangerous substances
17 04 10*	cables containing oil, coal tar and other dangerous substances which require high temperature incineration
17 04 11	cables other than those mentioned in 17 04 10 that are not suitable for processing in an alternative waste management facility due to contamination
17 05	*soil (including excavated soil from contaminated sites), stones and dredging spoil*
17 05 03*	soil and stones containing dangerous substances
17 05 04	soil and stones other than those mentioned in 17 05 03 that are not suitable for processing in an alternative waste management facility due to contamination
17 05 05*	dredging spoil containing dangerous substances
17 05 06	dredging spoil other than those mentioned in 17 05 05 that is not suitable for processing in an alternative waste management facility due to contamination
17 05 07*	track ballast containing dangerous substances
17 05 08	track ballast other than those mentioned in 17 05 07 that is not suitable for processing in an alternative waste management facility due to contamination
17 06	*insulation materials and asbestos-containing construction materials*
17 06 01*	insulation materials containing asbestos
17 06 03*	other insulation materials consisting of or containing dangerous substances
17 06 04	insulation materials other than those mentioned in 17 06 01 and 17 06 03 that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
17 06 05*	construction materials containing asbestos
17 08	*gypsum-based construction material*
17 08 01*	gypsum-based construction materials contaminated with dangerous substances
17 08 02	gypsum-based construction materials other than those mentioned in 17 08 01 that are not suitable for processing in an alternative waste management facility due to contamination
17 09	*other construction and demolition wastes*
17 09 02*	construction and demolition wastes containing PCB (for example PCB-containing sealants, PCB-containing resin-based floorings, PCB-containing sealed glazing units, PCB-containing capacitors)
17 09 03*	other construction and demolition wastes (including mixed wastes) containing dangerous substances
17 09 04	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 that are not suitable for processing in an alternative waste management facility due to contamination
18	**WASTES FROM HUMAN OR ANIMAL HEALTH CARE AND/OR RELATED RESEARCH (except kitchen and restaurant wastes not arising from immediate health care)**
18 01	*wastes from natal care, diagnosis, treatment or prevention of disease in humans*
18 01 01	sharps (except 18 01 03)
18 01 02	body parts and organs including blood bags and blood preserves (except 18 01 03)
18 01 03*	wastes whose collection and disposal is subject to special requirements in order to prevent infection
18 01 04	wastes whose collection and disposal is not subject to special requirements in order to prevent infection (for example dressings, plaster casts, linen, disposable clothing, diapers)
18 01 06*	chemicals consisting of or containing dangerous substances
18 01 07	chemicals other than those mentioned in 18 01 06
18 01 08*	cytotoxic and cytostatic medicines
18 01 09	medicines other than those mentioned in 18 01 08
18 01 10*	amalgam waste from dental care
18 02	*wastes from research, diagnosis, treatment or prevention of disease involving animals*
18 02 01	sharps (except 18 02 02)
18 02 02*	wastes whose collection and disposal is subject to special requirements in order to prevent infection
18 02 03	wastes whose collection and disposal is not subject to special requirements in order to prevent infection
18 02 05*	chemicals consisting of or containing dangerous substances
18 02 06	chemicals other than those mentioned in 18 02 05

Code	Description of waste
18 02 07*	cytotoxic and cytostatic medicines
18 02 08	medicines other than those mentioned in 18 02 07
19	**WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE**
19 01	*wastes from incineration or pyrolysis of waste*
19 01 05*	filter cake from gas treatment
19 01 06*	aqueous liquid wastes from gas treatment and other aqueous liquid wastes
19 01 07*	solid wastes from gas treatment
19 01 10*	spent activated carbon from flue-gas treatment
19 01 11*	bottom ash and slag containing dangerous substances
19 01 12	bottom ash and slag other than those mentioned in 19 01 11 which require thermal treatment (e.g. due to contaminants being present or that are not suitable for disposal in a landfill)
19 01 13*	fly ash containing dangerous substances
19 01 14	fly ash other than those mentioned in 19 01 13 which require thermal treatment (e.g. due to contaminants being present or that are not suitable for disposal in a landfill)
19 01 15*	boiler dust containing dangerous substances
19 01 16	boiler dust other than those mentioned in 19 01 15 which require thermal treatment (e.g. due to contaminants being present or that are not suitable for disposal in a landfill)
19 01 17*	pyrolysis wastes containing dangerous substances
19 01 18	pyrolysis wastes other than those mentioned in 19 01 17 which require thermal treatment (e.g. due to contaminants being present or that are not suitable for disposal in a landfill)l
19 01 19	sands from fluidised beds which require thermal treatment (e.g. due to contaminants being present or that are not suitable for disposal in a landfill)
19 02	*wastes from physico/chemical treatments of waste (including dechromatation, decyanidation, neutralisation)*
19 02 03	premixed wastes composed only of non-hazardous wastes that are not suitable for processing in an alternative waste management facility due to contamination
19 02 04*	premixed wastes composed of at least one hazardous waste
19 02 05*	sludges from physico/chemical treatment containing dangerous substances
19 02 06	sludges from physico/chemical treatment other than those mentioned in 19 02 05 that are not suitable for processing in an alternative waste management facility due to contamination
19 02 07*	oil and concentrates from separation
19 02 08*	liquid combustible wastes containing dangerous substances
19 02 09*	solid combustible wastes containing dangerous substances

Code	Description of waste
19 02 10	combustible wastes other than those mentioned in 19 02 08 and 19 02 09 that are not suitable for processing in an alternative waste management facility due to contamination
19 02 11*	other wastes containing dangerous substances
19 03	*stabilised/solidified wastes (4)*
19 03 04*	wastes marked as hazardous, partly (5) stabilised
19 03 05	stabilised wastes other than those mentioned in 19 03 04 that are not suitable for processing in an alternative waste management facility due to contamination
19 03 06*	wastes marked as hazardous, solidified
19 03 07	solidified wastes other than those mentioned in 19 03 06 that are not suitable for processing in an alternative waste management facility due to contamination
19 04	*vitrified waste and wastes from vitrification*
19 04 02*	fly ash and other flue-gas treatment wastes
19 04 03*	non-vitrified solid phase
19 04 04	aqueous liquid wastes from vitrified waste tempering that are not suitable for processing in an alternative waste management facility due to contamination
19 05	*wastes from aerobic treatment of solid wastes*
19 05 01	non-composted fraction of municipal and similar wastes that is not suitable for processing in an alternative waste management facility due to contamination
19 05 02	non-composted fraction of animal and vegetable waste that is not suitable for processing in an alternative waste management facility due to contamination
19 05 03	off-specification compost that is not suitable for processing in an alternative waste management facility due to contamination
19 06	*wastes from anaerobic treatment of waste*
19 06 03	liquor from anaerobic treatment of municipal waste that is not suitable for processing in an alternative waste management facility due to contamination
19 06 04	digestate from anaerobic treatment of municipal waste that is not suitable for processing in an alternative waste management facility due to contamination
19 06 05	liquor from anaerobic treatment of animal and vegetable waste that is not suitable for processing in an alternative waste management facility due to contamination
19 06 06	digestate from anaerobic treatment of animal and vegetable waste that is not suitable for processing in an alternative waste management facility due to contamination
19 07	*landfill leachate*
19 07 02*	landfill leachate containing dangerous substances
19 07 03	landfill leachate other than those mentioned in 19 07 02 that is not suitable for processing in an alternative waste management facility due to contamination
19 08	*wastes from waste water treatment plants not otherwise specified*
19 08 01	screenings that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
19 08 02	waste from desanding that is not suitable for processing in an alternative waste management facility due to contamination
19 08 05	sludges from treatment of urban waste water that are not suitable for processing in an alternative waste management facility due to contamination
19 08 06*	saturated or spent ion exchange resins
19 08 07*	solutions and sludges from regeneration of ion exchangers
19 08 08*	membrane system waste containing heavy metals
19 08 09*	grease and oil mixture from oil/water separation containing edible oil and fats
19 08 10*	grease and oil mixture from oil/water separation other than those mentioned in 19 08 09
19 08 11*	sludges containing dangerous substances from biological treatment of industrial wastewater
19 08 12	sludges from biological treatment of industrial wastewater other than those mentioned in 19 08 11 that are not suitable for processing in an alternative waste management facility due to contamination
19 08 13*	sludges containing dangerous substances from other treatment of industrial wastewater
19 08 14	sludges from other treatment of industrial wastewater other than those mentioned in 19 08 13 that are not suitable for processing in an alternative waste management facility due to contamination
19 09	*wastes from the preparation of water intended for human consumption or water for industrial use*
19 09 01	solid waste from primary filtration and screenings that is not suitable for processing in an alternative waste management facility due to contamination
19 09 02	sludges from water clarification that are not suitable for processing in an alternative waste management facility due to contamination
19 09 03	sludges from decarbonation that are not suitable for processing in an alternative waste management facility due to contamination
19 09 04	spent activated carbon that is not suitable for processing in an alternative waste management facility due to contamination
19 09 05	saturated or spent ion exchange resins that are not suitable for processing in an alternative waste management facility due to contamination
19 09 06	solutions and sludges from regeneration of ion exchangers that are not suitable for processing in an alternative waste management facility due to contamination
19 10	*wastes from shredding of metal-containing wastes*
19 10 01	iron and steel waste that is not suitable for processing in an alternative waste management facility due to contamination
19 10 02	non-ferrous waste that is not suitable for processing in an alternative waste management facility due to contamination
19 10 03*	fluff-light fraction and dust containing dangerous substances

Code	Description of waste
19 10 04	fluff-light fraction and dust other than those mentioned in 19 10 03 which require thermal treatment (e.g. due to contaminants being present or that are not suitable for disposal in a landfill)
19 10 05*	other fractions containing dangerous substances
19 10 06	other fractions other than those mentioned in 19 10 05
19 11	*wastes from oil regeneration*
19 11 01*	spent filter clays
19 11 02*	acid tars
19 11 03*	aqueous liquid wastes
19 11 04*	wastes from cleaning of waste with bases
19 11 05*	sludges from on-site effluent treatment containing dangerous substances
19 11 06	sludges from on-site effluent treatment other than those mentioned in 19 11 05 that are not suitable for processing in an alternative waste management facility due to contamination
19 11 07*	wastes from flue-gas cleaning
19 12	*wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified*
19 12 01	paper and cardboard that is not suitable for processing in an alternative waste management facility due to contamination
19 12 02	ferrous metal that is not suitable for processing in an alternative waste management facility due to contamination
19 12 03	non-ferrous metal that is not suitable for processing in an alternative waste management facility due to contamination
19 12 04	plastic and rubber that is not suitable for processing in an alternative waste management facility due to contamination
19 12 05	glass that is not suitable for processing in an alternative waste management facility due to contamination
19 12 06*	wood containing dangerous substances
19 12 07	wood other than that mentioned in 19 12 06 that is not suitable for processing in an alternative waste management facility due to contamination
19 12 08	textiles that are not suitable for processing in an alternative waste management facility due to contamination
19 12 09	minerals (for example sand, stones) that are not suitable for processing in an alternative waste management facility due to contamination
19 12 10	combustible waste (refuse derived waste) that is not suitable for processing in an alternative waste management facility due to contamination
19 12 11*	other wastes (including mixtures of materials) from mechanical treatment of waste containing dangerous substances
19 12 12	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11 that are not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
19 13	*wastes from soil and groundwater remediation*
19 13 01*	solid wastes from soil remediation containing dangerous substances
19 13 02	solid wastes from soil remediation other than those mentioned in 19 13 01 that are not suitable for processing in an alternative waste management facility due to contamination
19 13 03*	sludges from soil remediation containing dangerous substances
19 13 04	sludges from soil remediation other than those mentioned in 19 13 03 that are not suitable for processing in an alternative waste management facility due to contamination
19 13 05*	sludges from groundwater remediation containing dangerous substances
19 13 06	sludges from groundwater remediation other than those mentioned in 19 13 05 that are not suitable for processing in an alternative waste management facility due to contamination
19 13 07*	aqueous liquid wastes and aqueous concentrates from groundwater remediation containing dangerous substances
19 13 08	aqueous liquid wastes and aqueous concentrates from groundwater remediation other than those mentioned in 19 13 07 that are not suitable for processing in an alternative waste management facility due to contamination
20	**MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS**
20 01	*separately collected fractions (except 15 01)*
20 01 01	paper and cardboard that is not suitable for processing in an alternative waste management facility due to contamination
20 01 02	glass that is not suitable for processing in an alternative waste management facility due to contamination
20 01 08	biodegradable kitchen and canteen waste that is not suitable for processing in an alternative waste management facility due to contamination
20 01 10	clothes that are not suitable for processing in an alternative waste management facility due to contamination
20 01 11	textiles that are not suitable for processing in an alternative waste management facility due to contamination
20 01 13*	solvents
20 01 14*	acids
20 01 15*	alkalines
20 01 17*	photochemicals
20 01 19*	pesticides
20 01 23*	discarded equipment containing chlorofluorocarbons
20 01 25	edible oil and fat that is not suitable for processing in an alternative waste management facility due to contamination
20 01 26*	oil and fat other than those mentioned in 20 01 25

Code	Description of waste
20 01 27*	paint, inks, adhesives and resins containing dangerous substances
20 01 28	paint, inks, adhesives and resins other than those mentioned in 20 01 27 that are not suitable for processing in an alternative waste management facility due to contamination
20 01 29*	detergents containing dangerous substances
20 01 30	detergents other than those mentioned in 20 01 29 that are not suitable for processing in an alternative waste management facility due to contamination
20 01 31*	cytotoxic and cytostatic medicines
20 01 32	medicines other than those mentioned in 20 01 31
20 01 33*	batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries
20 01 34	batteries and accumulators other than those mentioned in 20 01 33 that are not suitable for processing in an alternative waste management facility due to contamination
20 01 35*	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (6)
20 01 36	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35 that are not suitable for processing in an alternative waste management facility due to contamination
20 01 37*	wood containing dangerous substances
20 01 38	wood other than that mentioned in 20 01 37 that is not suitable for processing in an alternative waste management facility due to contamination
20 01 39	plastics that are not suitable for processing in an alternative waste management facility due to contamination
20 01 40	metals that are not suitable for processing in an alternative waste management facility due to contamination
20 01 41	wastes from chimney sweeping that are not suitable for processing in an alternative waste management facility due to contamination
20 01 99	other fractions not otherwise specified that are not suitable for processing in an alternative waste management facility due to contamination
20 02	*garden and park waste (including cemetery waste)*
20 02 01	biodegradable waste that are not suitable for processing in an alternative waste management facility due to contamination
20 02 02	soil and stones that are not suitable for processing in an alternative waste management facility due to contamination
20 02 03	other non-biodegradable wastes that are not suitable for processing in an alternative waste management facility due to contamination
20 03	*other municipal wastes*
20 03 01	mixed municipal waste that is not suitable for processing in an alternative waste management facility due to contamination
20 03 02	waste from markets that is not suitable for processing in an alternative waste management facility due to contamination

Code	Description of waste
20 03 03	street-cleaning residues that are not suitable for processing in an alternative waste management facility due to contamination
20 03 04	septic tank sludge that is not suitable for processing in an alternative waste management facility due to contamination
20 03 06	waste from sewage cleaning that is not suitable for processing in an alternative waste management facility due to contamination
20 03 07	bulky waste that is not suitable for processing in an alternative waste management facility due to contamination

I Waste Acceptance Procedures

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