MS 2C - Waste Treatment

1.0 Part 1 - Facility Operating Manual

The Contractor shall provide an Operating Manual in advance of the Planned Services Commencement Date. This Operating Manual will be updated when necessary during the Services Period and will include:

- a description of the activities needed to operate the Facility on a day-to-day basis and how the activities interact;
- operational instructions for the key technologies and treatment processes at the Facility; and
- details on how the Facility will treat Contract Waste in order to meet the Output Specification.

The contents of the Operating Manual shall include as a minimum the areas set out below.

1. Overview

1.1 Contract information

1. 2 Scope of management plan

2. Organisation

2.1 Service organisation chart

2.2 Responsibilities

3. Resource management

3.1 Human resources

3.2 Infrastructure

3.3 Work environment

4. Control of documentation and records

4.1 Reference documents

4.2 Distribution of documents

4.3 Record control list

5. Provision of the service

5.1 Applicable requirements

5.2 Service planning

5.3 Business co-ordination and subcontracting

5.4 Identification and traceability

5.5 Product preservation

5.6 Purchases

6. Measurement, analysis and improvement

6.1 Control of monitoring and measurement Equipment

6.2 Monitoring and measurement

2.0 Part 2 - Waste treatment process

The Waste treatment process can be divided into the stages set out below.

2.1 Waste reception

The procedure for waste reception at the entry to the Site is described in detail in MS 2B (Waste Reception).

2.2 Waste storage

All Authorised Vehicles carrying Contract Waste that has been Accepted for Processing will tip their Contract Waste into the Waste bunker.

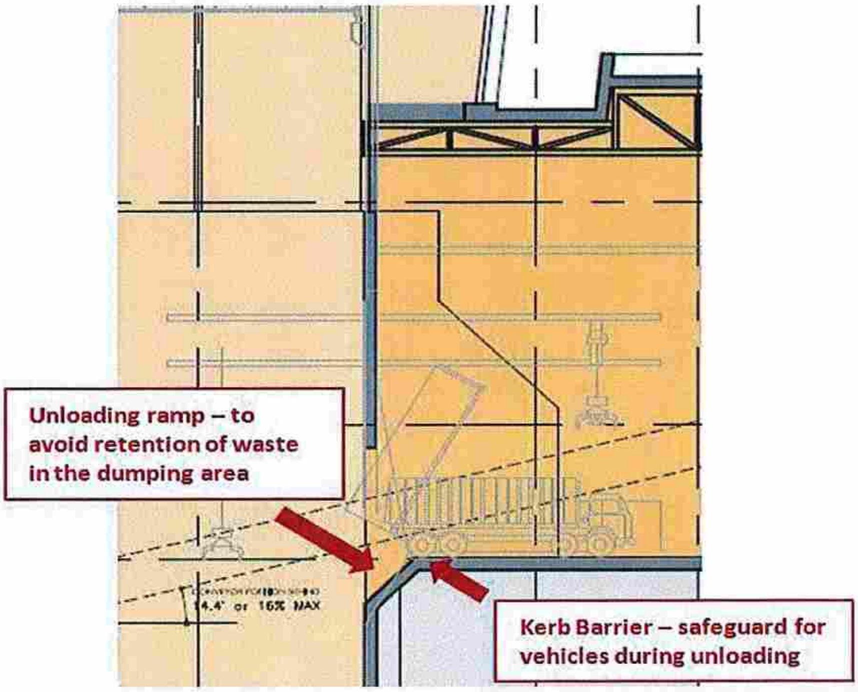

Figure MS2C.1 - Waste storage - unloading

Vehicles will be directed to a specific tipping bay in the tipping hall and will reverse into the tipping bay until the rear wheels touch the kerb barrier provided for this purpose. The Contract Waste will then be unloaded into the Waste bunker (see figure MS2C.1 above).

[redacted]

Figure MS2C.2 - Waste storage areas

Waste already deposited in the Waste bunker will be handled in order not to interfere with the subsequent unloading process. Digging out the unloading area of the Waste bunker will allow the Contractor to keep Waste to an acceptable level for the following discharging processes.

[redacted]

Storage zones will be located at both lateral ends of the Waste bunker and the area opposite to the discharging platform. The premixed Waste will be piled in these zones in the event that it cannot be immediately processed.

At both sides of the Waste bunker building, two grab crane parking positions will be provided, allowing space to lower the crane's grab to ground level in order for maintenance to be carried out.

2.2.1 Fire protection

In order to minimise the potential for fire in the Waste bunker, the following measures will be taken:

- infra-red (IR) camera systems will be installed which scan the Waste surface regularly and produce a "heat profile" for the grab crane operator;
- if a hotspot is detected, the Waste in this area will be picked up by the grab crane operator and loaded into the feed chute. If the hotspot has developed into a fire, the surrounding Waste will be removed using the grab crane;
- [redacted];

- [redacted];
- water cannons will be provided above the Waste bunker. These will be used to settle dust as well as for fire fighting; and
- the grab cranes will be remotely operated from the grab crane cabin.

2.3 Removal of Unacceptable Waste and/or unsuitable Waste discharged into the Waste bunker

The Waste grab crane operator will inspect the Waste that is handled in order to identify Unacceptable Waste and remove it from the Waste bunker using the grab crane.

2.3.1 Bulky Waste

Any deliveries of bulky Waste tipped directly into the Waste bunker will be taken by the grab crane system to the shredder. The feed hopper of the shredder is installed at the same level as the incinerator feed hopper in order to facilitate fall back and/or discharge of Waste into the Waste bunker. Bulky materials that will not damage the shredder will be taken via the grab crane system into the shredder system. Shredded Waste will fall into the Waste bunker through an opening in the Waste bunker wall.

2.3.2 Unsuitable shredding materials

If an object cannot be shredded, the procedure will be as follows:

- the grab crane maintenance aperture will be opened (this opening is located in the maintenance area, and the main purpose of this is to enable the grab crane to be lowered to ground level for repair);
- a suitable container will then be placed under the grab crane maintenance opening;
- the grab crane will take the object, lift and move it to above the maintenance opening and lower the object into the container; and
- a vehicle will then move the container into the Waste Inspection Area. Schedule 31 (Waste Acceptance Protocol) of the Contract will apply at this point.

If required for fire protection, a fire gate will be installed between the shredder and the Waste bunker.

2.4 Waste grab cranes

Two grab cranes will be located in the Waste bunker area, each of which will be able to operate across the whole area of the Waste bunker and the hopper which feeds the incinerator. Both grab cranes will be fitted with a grab claw capable of holding the level of Waste required by the Facility. The grab cranes will then distribute the Waste uniformly within the Waste bunker in order to obtain a homogenous fuel.

Each grab crane will be fitted with a weighing device mounted on the grab claw. The net weight of the Waste will be transmitted to the control units at the point when the claw is above the feed hopper. This information will be used by the distributed control system (DCS) to monitor plant performance based on the sum of all the values for supplied Waste and compare these values with the electricity generated in order to calculate an indicator of the performance of the Facility. The Contractor will ensure that the grab cranes are calibrated on a regular basis as per the manufacturer's instructions.

[redacted]

2.5 Energy from Waste

The incinerator feed hopper will receive Waste from the grab crane and will send the Waste down to the furnace.

The furnace structure will be covered by a lining of heat-resistant material which protects the outer frame from corrosive effects. The thickness and composition of this heat-resistant lining will be calculated in accordance with the full range of temperatures that will be reached inside the furnace.

The furnace will meet the requirement that the gases remain at a temperature exceeding 850ºC for a minimum of two (2) seconds. Auxiliary burners will automatically light up when the temperature in the combustion chamber falls below a predetermined value.

The 850ºC temperature will be maintained at all times during start up and shutdown operations whilst there is Waste still present in the combustion chamber. The light fuel oil for the burners will be supplied via a regulating and measuring unit located within the furnace installation.

The required oxygen will be supplied by way of air being sucked in from the Waste bunker. The Waste bunker will be maintained at a slightly reduced pressure to ensure that odour and bioaerosol release from the Facility is avoided.

Air from the Waste bunker will be injected into the furnace as primary air via the primary air ventilator into the lower part of the furnace, facilitating combustion of Waste. The remainder of the air will be injected as secondary air via the secondary air ventilator in order to complete the combustion of volatile elements and particles of carbon which may be drawn up by the generated gases.

The furnace temperature will be controlled by several thermocouples which will be co-ordinated in line with the DCS of the Facility. The DCS will co-ordinate the various parameters which affect good combustion, such as the amount of Waste, the required amount of oxygen, the combustion temperature and the production of steam.

2.5.1 Heat recovery and steam production

The high-pressure steam boiler will recover energy from the exhaust gas, and this will be maximised by means of superheaters and separate supply water economisers integrated within the boiler system.

[redacted]

The lower part of the boiler will be equipped with hoppers that collect the ash from the boiler, which will be unloaded into the slag extraction system.

The water level in the boiler will be automatically controlled and a purging system will be operated.

A rapping device will be used to clean the superheater surfaces and the economiser bundles. The second and third boiler pass will be cleaned using water jets.

[redacted]

The outlet temperature of the superheated steam will be monitored. The temperature of the superheated steam will be controlled by an attemperator, using spray water from the boiler supply pump. This water will be injected into the boiler steam circuit at the superheater stage.

The flow of steam will be controlled and the load supplied to the furnace will be regulated in order to achieve the desired steam flow.

[redacted]

2.5.2 Flue gas treatment (FGT)

Flue gas will be treated to remove elements such as acid gases, dust and heavy metals to be compliant, as a minimum, with the Waste Incineration Directive 2000 or equivalent Legislation.

Flue gas will firstly enter a conditioning tower where it will be cooled [redacted] with water spray. The flue gas will then enter a reactor where activated carbon, hydrated lime and humidified re-circulated reagents will be added and will react with the flue gas, attaining the required reduction of acidic contaminants, heavy metals and dioxins.

2.6 Control and monitoring system

2.6.1 General description

The process will be controlled and supervised by the DCS from which all relevant Equipment and fixed installations will be operated and its condition indicated on operator monitors.

All relevant process measuring, trend curves and alarms will be shown on the monitors, as well as trend curves of process measurement. The control may either be automatic or manual mode.

2.6.2 Control concept

The high standards which are required to be reached during incineration will be achieved by ensuring the correct feeding and movement of Waste through the furnace, the supply of combustion air and the flow patterns in the furnace and boiler.

The incineration process will be automatically controlled in order to maintain stable energy generation and optimum combustion conditions. It will also be possible to control and monitor temperatures in the furnace and boiler.

2.6.3 Combustion control

The proposed advanced Waste incinerator control system (a specific program that interprets the signals received from the combustion process) will be designed to operate the Facility using an automatic control system.

The automatic control system will enable:

- operation of all the operative parts of the Facility from the control room via remote control, and the monitoring and recording of all key operational data as and when required;
- rapid correction and adjustment of the controlling parameters;
- minimisation of the impact of major variations in the composition of the Waste;
- [redacted]; and

- operation of the entire Facility using a minimum number of Personnel.

2.6.4 FGT monitoring system

An emission monitoring station with a sampling system, including extractive heated probe and connecting piping to the multigas analyser, will be installed downstream of the flue gas cleaning system. In addition, a dust monitoring device will be supplied.

Sampling ports for manual testing will also be provided.

The software used in the FGT monitoring system will be in accordance with European standard EN14181 on "Stationary source emissions – Quality assurance of automated measuring systems (AMS)".

2.7 Incinerator Bottom Ash (IBA) treatment

The IBA exiting the combustion process falls into the IBA quenching system where the IBA is cooled. IBA will then be sent by means of covered conveyor belts to the on-site IBA treatment area for drying. The IBA treatment area will be an enclosed area. The IBA will be classified by size, and ferrous and non-ferrous materials will be recovered by electromagnetic and eddy current separators. The classified IBA will then undergo a maturation process over approximately two (2) months in order to ensure a final marketable Product in accordance with relevant standards as indicated in MS 3 (Markets for Products). Suitable quality controls will be used in this process in order to ensure a high quality of treatment and a product suitable for quality market outlets.

2.7.1 Drying and initial classification

IBA will be stored in concrete boxes directly from the conveyor belt. Drying takes place by means of water evaporation and leaching. After the drying stage, a wheel loader will collect the IBA and it will be unloaded onto [redacted] the feed hopper, [redacted]

[redacted].

2.7.2 Processing the [redacted] fraction

IBA of [redacted] will be carried by conveyor belt to the disc-screen that will further classify the material [redacted].

- Selection on the [redacted] line

  The fraction smaller than [redacted] will be pass through a magnetic separator and an eddy current separator, separating ferrous metal and non-ferrous metal elements [redacted] Where the Operational Sub-Contractor makes the decision that a baler is required to deliver the Project, the Operational Sub-Contractor will assume any associated costs.

- Selection on the [redacted] line

  The fraction larger than [redacted] will be taken by conveyor belt to a magnetic separator. The selected ferrous materials will be deposited through a chute into a tilting container.

2.7.3 Processing the [redacted] fraction

IBA with elements larger than [redacted] will be rejected and sent to Landfill for disposal.

3.0 Part 3 - Treatment capacity

The treatment capacity of the Facility is set out in the combustion diagram (Figure MS2C.3).

[redacted]

Figure MS2C.3 – Facility treatment capacity

Item	Limit
Planning Limit	EfW: 190,000 tpy [redacted]
Mechanical limit	[redacted]
Nominal capacity (Point at which the maximum level of efficiency is achieved)	[redacted]

Table MS2C.1 - Items and limits

4.0 Part 4 - Waste storage plan

Contract Waste treatment and Product storage will take place within designated enclosed areas with appropriate environmental controls put in place in accordance with relevant Guidance.

Contract Waste and Products will be stored in suitable storage facilities which are capable of storing up to an average of four (4) days' Contract Waste delivered to the Site and/or Products produced.

In accordance with paragraph 17.3 of Schedule 2 (Output Specification) of the Contract, the Facility and designated areas at the Site shall have sufficient clear, visible and legible signage in place in order to safely divert authorised users and visitors around the Site (including signage for containers, storage areas and Personnel welfare facilities) and such signage shall be kept clean, up to date and free from damage.

The following reagents used during the combustion process (as set out in Table MS2C.2) will also be stored at the Facility:

Reagent	Containment	Maximum Volume
Hydrated lime	Silo	[redacted]
Activated carbon	Silo	[redacted]
Ammonia	Tank	[redacted]
Light fuel oil	Tank	[redacted]
Fuel for mobile equipment	Tank	[redacted]
Caustic soda	Tank	5 m^3
Hydrochloric acid	Tank	5 m^3

Table MS2C.2 – Reagents used during combustion process

Rejected materials from the combustion process will be stored in the following locations at the Facility:

- air pollution control (APC) residues - the APC residues storage silo has a capacity equating to [redacted] of production at nominal load; and
- IBA - the IBA will be stored inside the IBA building in [redacted] designated bays. The [redacted] bays have a capacity equating approximately to a [redacted] day period of slag production.

Rejected materials from the IBA mechanical treatment will be stored within the IBA building in open containers with capacities ranging from 20m^3 to 40m^3. Once a container is full, it will be covered and moved to a location on the concrete platform next to the IBA building. A maximum of two (2) covered containers at any one time will be stored in this location during the Opening Hours. Such containers will not be kept at this location outside of the Opening Hours in compliance with paragraph 7.7 Schedule 2 (Output Specification) of the Contract.

Recyclables obtained from the IBA mechanical treatment (ferrous and non-ferrous metals) will be stored on the concrete platform inside the IBA building until transportation to an agreed final disposal location has been confirmed. Aggregates obtained from the IBA mechanical treatment will be stored inside the IBA building in [redacted] designated bays. The [redacted] bays will have a capacity equating approximately to [redacted] of aggregate production.

4.1 Waste storage

4.1.1 Short-term peaks

Waste storage during short-term peaks will be managed in accordance with MS 2A (Operational Interface).

4.1.2 Weekend and holiday periods

The Facility will continue to operate during weekends and public holidays without interruption.

4.2 Waste storage during planned and Emergency downtime

4.2.1 Planned plant shutdown

There will be no impact on incoming Contract Waste in the event that the process line is required to shut down for a short period. These periods will be managed in line with the capacity of the Waste bunker. Facility Personnel will manage the feed rate to ensure that, before a short term planned interruption of delivery occurs, the Waste inside the Waste bunker is at a level so as to ensure there is enough capacity to continue receiving Contract Waste during the interruption time.

Major planned maintenance, which will form part of Planned Maintenance, will be restricted to the annual outage of the Facility (typically two (2) to three (3) weeks in duration). This outage will be planned in advance and the Authority, WCAs and HRC providers will be informed in advance of any required changes to be made to the provision of the Services in light of any such planned outage.

[redacted] The procedures to be followed during a prolonged period of shutdown will be as set out in MS 2G (Contingency Plan).

Any Waste received in excess of the storage capacity of the Waste bunker will be diverted to alternative delivery points as proposed in MS 2G (Contingency Plan).

Prior to the commencement of the annual outage period, the relevant Facility Personnel will empty the Waste bunker as far as is reasonably practicable in order to provide sufficient reserve capacity to allow deliveries of Contract W