30

ORAL HEARING INTO

PROPOSED DECISION 167-1

CARRANSTOWN WASTE MANAGEMENT FACILITY

PROOF OF EVIDENCE

Process Description

Conor Jones

INDAVER IRELAND

1. Introduction

My name is Conor Jones and I am Site Services Manager and a Project Manager with Indaver Ireland. I am a Chemical Engineering graduate of University College Dublin. I have 6 Years experience in the Waste Management Industry with Indaver Ireland. In my first three years with the company, I managed our Waste Transfer Station in Dublin Port and for all six years I have also managed our on-site services division.

2. Scope

I will be covering the following elements of the proposed facility in my evidence;

- Construction
- Waste acceptance and handling
- Process Description
- Emissions Monitoring
- Ash Classification.

3. Construction

Construction of the facility will be in two stages. The first stage of the development will be the construction of the site civil infrastructure. This will be a contract managed from Ireland with the assistance of a civil engineering consultancy.

The consultant will work with Indaver to select a Civil Contractor to prepare the site, install drainage, foundations, roads, hard standing areas, offices and landscaping.

The second stage involves the appointment of a specialist Turn Key contractor for the construction of the incineration plant to a performance specification laid down by Indaver. This contractor will be managed by our Belgian colleagues who have experience of the construction of these facilities.

The contractor delivers a fully functioning plant to their clients and are also responsible for the training of managers and operators. They continue working on site for up to twelve months after construction is completed.

4. Waste Acceptance and Handling

All trucks delivering waste to the incineration plant will arrive at scheduled times within the hours of waste acceptance 8.00 am to 18.30 Monday to Friday and 8.00 to 14.00 on Saturdays.

Waste trucks will drive onto the weighbridge, located outside the security office inside the main gate. Drivers will then present their documentation to the staff in the security office. The weight of each load will be recorded entered on the relevant documentation and the plants computer system.

Following completion of the waste acceptance procedures, the trucks will proceed via the site road to the enclosed reception hall. The reception hall will be manned and the truck will be directed to tip into the appropriate bunker

compartment. A certain number of trucks will be required to discharge their waste onto the floor of the waste reception hall to allow visual inspection of their contents, prior to transfer to the bunker.

To prevent the egress of odours the waste reception hall will be maintained under negative pressure, i.e. air will be drawn in through any openings rather than escaping out. Air for combustion will be drawn from the reception hall through the waste bunker. As the waste reception hall will be an enclosed area, windborne litter or dust will not be generated.

Waste Handling, Storage and Feeding

Crane operators, positioned in a control room/crane operator room overlooking the bunker, will use travelling grab cranes to mix the waste in the bunker compartment, so that despite the variety within the solid waste loads delivered, the feed to the furnaces will be relatively uniform.

The approach of the grab crane to the hopper opening will be controlled automatically by the plant's computerised control system. Once the operator has selected the option of placing the material held by the grab crane in the hopper, the crane will proceed to the hopper and discharge the material.

The bunker will have a total capacity of approximately 12,000m^3. The capacity has been chosen to allow the plant to accept waste during periods when the furnace or furnaces are shut down for maintenance and also to allow the plant to continue operating over prolonged periods, such as long weekends, without deliveries. This storage capacity is equivalent to circa 10 days operation of the plant.

5. Process Description

General

Two grate furnaces will be installed, each with a capacity of 75,000 tonnes per annum. Each furnace will be equipped with its own boiler, flue gas cooling and activated carbon/lime injection and baghouse filter stages. The flue gases after each baghouse will be combined before the wet scrubbing and tail end flue gas cleaning stages. A process flow diagram of this is shown over.

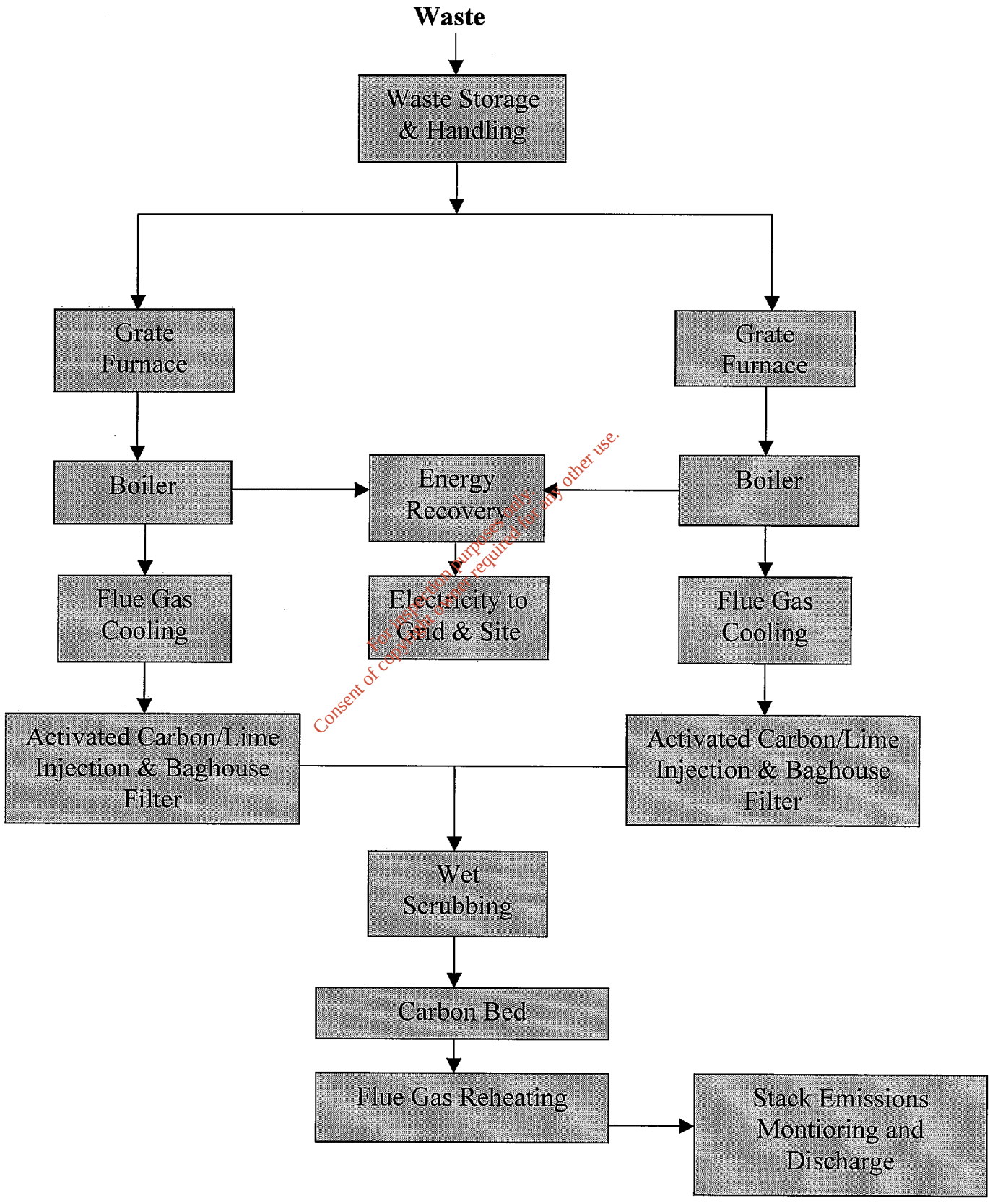
Moving Grate Furnace

Moving grate furnace technology will be installed for the waste incineration process. The "grate" of the furnace will be fitted with steel tiles. Some of the tiles will be fixed in place. Others will be controlled by hydraulic rams situated on the external walls of the furnace. The hydraulic rams will move the tiles, causing the waste to move onto the next tile, thereby moving the waste through the furnace.

The tiles will also be designed to allow the primary combustion air to pass up through the waste to ensure complete combustion. Waste will enter the grate of the furnace at the front and travel through the furnace to the ash discharge point at the far end. The furnace will be brick lined.

The moving grate furnace will have a gas burner and a supply of natural gas to initiate combustion, and raise the temperature of the furnace to the minimum required temperature of 850 °C before any waste is introduced. Natural gas will be used for the burner pilot flame and also as an auxiliary fuel to maintain the required temperature (min. 850 °C) in the furnace, in the event that the waste is not of sufficiently high calorific value.

WASTE TO ENERGY PLANT
PROCESS FLOW DIAGRAM



The minimum residence time of 2 seconds at 850 °C will achieved in the first pass of the boiler. Bottom ash will be discharged from the grate into a water bath to cool the ashes. These ashes are then taken by conveyor to the bottom ash bunker.

Boiler and Energy Production

The flue gases from the furnace (at temperatures >850 °C) then enter the boiler and the thermal energy contained in them is transformed into electricity using a conventional steam cycle. An array of boiler tube bundles hang in the path of the flue gases through the boiler to produce steam at 40bar and 400 °C. This steam is then expanded across a turbine to produce electricity. A total of 14MW of electricity for will be produced by the plant and 11MW will be exported to the national grid.

Using selective non-catalytic reduction, ammonia/urea will be injected into the boiler to reduce NO_x levels in the stack below the 200mg/m^3 limit in the waste incineration directive.

The tube bundles will be cleaned at regular intervals by an automatic system. The cleaning operation will be done using a pneumatic hammer mechanism, or a vibratory system or steam blowers. Regular cleaning will ensure that the boiler tube bundles do not become fouled and also reduces the risk of dioxin reformation in the boiler.

The residues from the cleaning operation will be collected in hoppers beneath the boiler and transported to the boiler ash silos in closed conveyors to prevent any dust emissions. The flue gases leave the boiler at approximately 230 °C.

Spray Tower

The combustion gases leaving the boilers will still be relatively hot at approximately 230°C. They will be further cooled in the spray tower to a temperature of 140 -170°C. The spray tower will have two functions:

1. The flue gases will be cooled prior to the injection of activated carbon and lime and the bag house filter. This will protect the baghouse filter from overheating.
2. The process effluent, generated mainly from the wet scrubbing process will be evaporated during the cooling of the flue gases. This stage ensures an effluent free plant.

A very small quantity of dried solid residues will fall into a bag at the base of the tower, while the majority will remain entrained in the combustion gases. These residues will be collected in flexible intermediate bulk containers and combined with flue gas cleaning residues from the baghouse filter.

Activated Carbon/Lime Injection and Baghouse Filter

Activated carbon and lime will be injected into the flue gases leaving the spray tower. Heavy metals and dioxins in the flue gases will be removed from the flue gases by means of adsorption onto the surface of the granules of the activated carbon and lime mixture. The activated carbon and lime and any other particulates will then be removed from the flue gases by filtration in the baghouse filter. The activated carbon and unreacted lime from the spray reactor will form a cake on the sleeves of the filter.

This cake is called flue gas cleaning residues and is removed from the sleeves automatically to hoppers beneath the baghouse. These residues are then transported via closed conveyors to silos to prevent any dust emissions.

Wet Scrubbers

Two wet scrubbers will be used in series. The purpose of the scrubbers is to remove acid gases, SO_2, HCl & HF from the flue gases. Both scrubbers will use either lime or limestone in solution. The first scrubber will operate at a pH of between 2-3 and the second at a pH of approximately 6.

In the first scrubber, the scrubbing liquid will cool the flue gases and remove mainly HCl and HF from the flue gases. The spent scrubbing liquid will be returned to the spray tower, where the water will be evaporated.

The flue gases will then enter the second scrubber, where SO_2 will mainly be removed. A purge will be taken from the spent scrubbing liquid for the removal of gypsum and the remainder will be returned to the spray tower as described above. Return of the scrubbing liquid from both scrubbers to the spray tower ensures that there will be no process effluent from the plant.

Carbon Bed

The carbon bed consists of a fixed bed of activated lignite cokes. The flue gases will pass upwards through the bed of cokes (approximately 2m in depth) that will absorb remaining trace dioxins, heavy metals and hydrocarbons. The flue gas temperature leaving the tail end flue gas cleaning system will be approximately 60 °C.

The carbon bed system will operate in overpressure and will be based on a modular design, containing separate modules, allowing one module to be shut off at any time. The flue gases must still pass through the remaining modules and therefore will be treated.

Approximately once a week a small fixed amount of cokes will be extracted from the bottom of the filter. The removal will be effected by adding water into the coke bed and opening a valve at the bottom through which the cokes can be extracted. The lignite cokes and water removed will be recovered for incineration in the furnace. During maintenance, a depth of 0.5m of lignite cokes will be added to the top of the carbon bed to replace any carbon removed during weekly extractions.

It should be noted that the emission limits for heavy metals and dioxins can be comfortably met without the addition of this final flue gas cleaning step.

6. Emissions Monitoring

The concentration of the following compounds are monitored on a continuous basis in the stack

- Total dust
- Total organic carbon (TOC)
- Hydrogen chloride (HCl)
- Sulphur Dioxide (SO_2)
- Oxides of Nitrogen (NO_x)
- Carbon Monoxide (CO)

Other process parameters such as temperature, pressure, flow, oxygen content and humidity are also monitored continuously.

Other compounds are monitored on a discontinuous basis in line with the Waste Incineration Directive and the proposed decision from the EPA;

- Cadmium & Thallium (Cd & Tl)
- Mercury (Hg)
- Sum of Metals (Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V)
- Hydrogen Fluoride (HF)
- Nitrous Oxide (N_2O)
- Dioxins and Furans

The slide shows the typical set up in an emissions monitoring laboratory. This room is located at the stack. Probes positioned in the stack direct flue gas samples to the various pieces of equipment for analysis. The equipment in this room will cost in the region of €1 million.

The emission values are then relayed to the incinerator control room, where the operators have 24 hour access to this information and can react accordingly. These emission values will also be monitored for compliance with the relevant licence conditions

7. Ash Sampling and Classification

General

All ash residues will be sampled regularly and subsequently analysed in order to determine whether they are classified as hazardous or not.

The classification of the residues as hazardous or not is made by referencing the composition of the residue with the classification rules set out in the European Waste Catalogue (EWC). If the residue does not contain the properties listed in H1 to H14 of the 'Waste Catalogue and Hazardous Waste List', and Annex III of the Hazardous Waste Directive 91/689/EEC, it is non-hazardous. The list makes provision for this choice of hazardous and non-hazardous, by the inclusion of "mirror entries" for all residues from the incineration process depending on the presence and concentration of "dangerous substances".

The monitoring regime is outlined below.

Monitoring Frequency

Schedule C.4 of the proposed licence requires that waste residue monitoring be conducted quarterly for the bottom ash and boiler ash and biannually on the flue gas cleaning residues and gypsum.

As proposed in attachment H11 of the waste licence application, Indaver will conduct full composition and leachate testing on the bottom ash, boiler ash and flue gas cleaning residues weekly (initially), until the composition has been confirmed.

Once initial characterisation tests indicate the composition and the classification for disposal of the various ash types, the classification is not expected to change and the monitoring of ash will be reduced in line with the licence requirements.

Classification

Bottom Ash

The bottom ash will be non hazardous and will consist mainly of silicates, minerals, and metals. The bottom ash will be sampled by an independent company, using standardised methods, to ensure that representative sampling is carried out prior to analysis. Until fully characterised, the analysis will be confirmed before the bottom ash is sent off site for disposal.

The EWC code for the bottom ash is 19 01 12, bottom ash and slag other than those mentioned in 19 01 11*.

Boiler Ash

Based on experience elsewhere in Europe it is expected that the boiler ash will be non hazardous for disposal. However this ash will be treated as hazardous until analysis confirms that it is non hazardous for disposal. The boiler ash will be sampled and analysed as outlined in section 13.4 of the licence application until fully characterised.

The EWC code for the boiler ash will be 19 01 15* (boiler dust containing dangerous substances) or 19 01 16 (boiler dust other than those mentioned in 19 01 15*) depending on the results of analysis.

Flue Gas Cleaning Residues

The flue gas cleaning residues will be classified as hazardous for disposal and will be disposed of to a hazardous waste landfill.

The EWC code for the flue gas cleaning residues is 19 01 07*, solid waste from gas treatment.

Gypsum

It is expected that the gypsum will be non hazardous for disposal. However it will be treated as hazardous until analysis confirms that it is non hazardous. If no reuse option can be found for the gypsum, it will be disposed of to a non hazardous waste landfill.

The EWC code for the gypsum is 19 01 05* (filter cake from gas treatment) or 19 01 07* (solid wastes from gas treatment) or 19 01 99 (waste not otherwise specified) depending on the results of analysis.

300a

BORD GAIS EIREANN

PILLTOWN TO NAVAN

CONSENT TO LAYING OF GAS PIPELINE(S) - CONSENT FORM

MARY ANNE & GERALDINE ELIZABETH CAMPBELL
CARRANSTOWN
DULEEK
CO. MEATH.

Drawing No. BGE/68/WL/05/13

MARY ANNE CAMPBELL QUINN. of CARANSTOWN. DULEEK. Co. Meath Married woman and GERALDINE ELIZABETH O'BRIEN (NEE CAMPBELL) of 32 DUNSANDLE COURT Castleknock, Dublin 15 Married woman

I/We ~~as tenants in common~~ ~~as joint tenants~~ am/are sole owners(s) / ~~joint owner(s) / Leaseholder(s) / occupying tenant(s)~~ of the land shown on the plan reference BGE.68 WL 05/13. *received from Bord Gais Eireann (BGE). Dated* 12/11/13

The land is used for the following purposes ** GRAZING LIVESTOCK.

In consideration of the payment to me/us of the sum referred to below and in further consideration of the undertakings to be entered into by BGE in the Deed of Easement (as per form attached) for the protection of the said land, I/We agree to (join in the) grant to BGE a wayleave (in the form of the Deed of Easement) to lay, operate and maintain a pipeline(s) and apparatus as defined in Clause A(iv) in the Deed of Easement connected therewith in a working strip of land, which may be subject to minor re-routing to meet particular construction and engineering requirements for the over-all pipeline of the width specified below and as indicated on the enclosed plan.

Width of Permanent Wayleave	-	*14 metres*
Width of Working Strip (including permanent wayleave).	-	*18 metres*

The working width may be varied to meet the particular requirements along the route.

I/We hereby acknowledge that I/We have received the form of Deed of Easement herein referred to, and I/We agree to execute the Deed of Easement in that form on completion of the project.

In consideration of the advance payment (as hereinafter specified) to be made to me/us under the terms aforesaid, I/We forthwith irrevocably authorise BGE, its servants, agents, consultants and contractors:-

(a) to enter upon the proposed wayleave strip, and

(b) to enter upon the adjoining working width.

purposes of laying, operating and maintaining the requisite pipeline(s) and ancillary apparatus as defined in Clause A(iv) in the Deed of Easement in connection therewith.

I/We note that the formal Deed of Easement will be prepared by BGE at their own expense and that BGE will pay me/us £5,950.00 (subject to verification of length of wayleave on final measurement) for permanent wayleave granted. I/We note that on the signing of this Consent Form BGE will make an advance payment (deposit) to me/us of £4,462.50 in respect of the permanent wayleave.

The consideration for the permanent wayleave is based on payment of £7.00 per linear metre. The advance payment (deposit) will be made subject to the establishment by me/us of prima evidence of title to the reasonable satisfaction of BGE. The total consideration payable will be adjusted on final measurement of the wayleave and the balance of the wayleave consideration will be paid subsequent to final measurement subject to the Deed of Easement being signed by me/us.

In addition to the foregoing, I/We also note that BGE will (under the terms of the Code of Practice) recompense me/us for damage/injury or losses incurred as a result of the carrying out of the proposed works and for any loss of agricultural earnings reasonably and necessarily incurred by me/us as a result thereof. The amount of such payment of payments shall be agreed, or failing agreement will be subject to arbitration in accordance with the provision of 1 (b) (ii) of the Code of Practice.

Signed: Geraldine Elizabeth Campbell O'Dwyer *Signed:* Mary Anne Campbell

Date: 15 JANUARY 1999 *Date:* 15 January 1999

WITNESS: Patrick C. Markey, Solicitor, South Quay, Drogheda, Co. Louth

Solicitor's Name PATRICK C. MARKEY & SON. Address: SOUTH QUAY, DROGHEDA, Co. Louth.

Please return this form when completed to:

PATRICK C. MARKEY & SON
SOLICITORS
SOUTH QUAY DROGHEDA
CO. LOUTH PH. 041-36471

The Secretary,
Bord Gais Eireann,
P.O. Box 51,
Inchera,
Little Island,
Co. Cork.

so as to reach him not later than 20th January 1999.

Note: ~~*If there is a leaseholder or occupying tenant, joint owners, joint leaseholders or joint tenants, please complete as appropriate or inform BGE.*~~

*(** Please complete)* We are owners as Tenants in Common in Equal Shares on Folio 5107 Co. Meath The lands had been let on an annual basis to 1/12/98 on 11 months grazing But have not yet been relet.