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INDAVER IRELAND

Date: 05th April 2004

Kieran O'Brien
Waste Licensing Section
Environmental Protection Agency
Inniscarra
Co. Cork

Dear Kieran,

Further to our meeting on March 9th 2004, please find attached the supplentary information requested which clarifies the technology selection for the flue gas cleaning systems involved in both phases of the proposed waste to energy plant at Ringaskiddy.

If there are any questions or queries that you may have, please don't hesitate to contact me.

Yours faithfully for
Indaver Ireland

Conor Jones
Project Engineer

Encl

SUPPLEMENTARY INFORMATION

1. Systems for the Abatement of Emissions to Atmosphere

The following is being submitted as supplementary following a meeting between Indaver and the EPA dated 9th March 2004. The purpose of this document is to clarify the technology options chosen for both phases of the proposed waste to energy plant at Ringaskiddy.

The following is a description of the flue gas cleaning systems for both phase 1 & 2 of the incinerator and the abatement system for the treatment of vent losses from the tank farm in phase 1.

1.1.1 Flue Gas Cleaning Systems

The flue gas cleaning systems for the treatment of pollutants in the flue gases will comprise the following:

- Selective non-catalytic reduction (SNCR) of NO_x using urea or ammonia
- 1 electrostatic precipitator
- 1 spray reactor (with injection of neutralisation agent)
- 1 baghouse filter (with injection of lime/activated carbon)
- 1 wet scrubber (with injection of neutralisation agent)
- 1 baghouse filter (with injection of lime/activated carbon).

The electrostatic precipitator is only a requirement for phase 1 of the facility. All of the remaining flue gas treatment systems will be identical for both phases.

A process flow diagram (figure 1 attached) shows the proposed flue gas cleaning systems for both phases of the waste to energy plant.

1.1.1 NO_x reduction using SNCR

This technology uses the reaction of ammonia and nitrogen oxides at high temperature to convert the nitrogen oxides to nitrogen and water vapour. This reaction will be achieved by the injection of either an ammonia solution or urea into the first section of the boiler. This technology has been described in detail in section 9.5.2.3 of the waste licence application and the control measures will be identical for either the ammonia or urea injection.

1.1.2 Electrostatic Precipitator

There will be an electrostatic precipitator installed between the boiler and evaporating spray tower on the fluidised bed line for dust collection. This will be a relatively coarse dust collector to collect any sand and coarse particles from the fluidised bed which become entrained in the flue gases.

This type of electrofilter has been described in detail in section 9.5.2.2 of the waste licence application.

1.1.3 Evaporating Spray Towers (Spray Reactors)

The evaporating spray towers will be used to cool the flue gases leaving the boilers. The spray towers will also be used as reactors for the neutralisation of acid gases. The evaporating spray towers will have three functions in total:

- The flue gases will be cooled prior to the injection of activated carbon and lime and the bag house filter.
- The process effluent, generated from the waste to energy plant will be evaporated during the cooling of the flue gases.
- A reagent such as lime milk will be injected into the evaporating spray tower for the neutralisation of acid gases (HCl and HF).

The operation of the evaporating spray towers has been described in section 3.10 of the waste licence application and the addition of lime in the spray towers (spray reactors) has been described in section 9.5.6 of the application. The use of the spray towers as reactors corresponds to configuration 2 of the wet scrubbing system as described in section 9.5.6 of the licence application (see section 1.1.5 below).

1.1.4 Baghouse Filter (with carbon injection)

Activated carbon and lime will be injected into the flue gases leaving the spray tower. The activated carbon and lime may be injected separately or may be pre-mixed prior to injection. The separate injection or pre-mixing prior to injection will not affect the operation or control of this system.

The activated carbon and lime will form a cake on the sleeves of the filter. Heavy metals, trace levels of organics and dioxins in the flue gases will be removed by means of adsorption onto the surface of the granules of the activated carbon and lime. The activated carbon and lime and any other particulates will then be removed from the flue gases by filtration in the bag house filter.

The activated carbon and lime will also remove Hydrochloric Acid (HCl) and Sulphur dioxide (SO_2) in the flue gases although this is not their primary function. This system is fully described in section 9.5 of the waste licence application.

1.1.5 Scrubber System

The scrubbing of acid gases from the flue gases will be done by a combination of semi-wet and wet scrubbing. The semi-wet scrubbing will be carried out in the evaporating spray towers as described in section 1.1.3 above. A neutralisation agent such as lime milk will be injected in the spray towers for the removal of HCl and HF. The operation and control of the system will not be affected by the choice of reagent.

For the wet scrubbing, a scrubbing tower will be used. This will be placed directly after the bag house filters. The scrubber tower will remove SO_2 and heavy metals by absorption in the scrubbing liquid. A good contact between the scrubbing liquid (with reagent) and the gases will be very important. This contact will be enhanced either by a filling material (packed tower) or by spraying nozzles. The absorption will be improved by adding an alkaline reagent that will chemically react with the acids to form salts. This reagent

may also be calcium based (lime) or caustic. The pH of this scrubber system will be 6. Again, the operation and control of the system will not be affected by the choice of reagent. The only difference will be in the amount and type of residues generated. The quantities of residues have been listed in section 12.2.8, table 12.3 of the waste licence application.

The scrubbing system chosen corresponds to the "configuration 2" option given in section 9.5.6 of the waste licence application. If the scrubber in this configuration were to fail, emission limits in the stack can still be met. If the levels of HF, HCl and SO_2 were to rise above preset levels in the stack an emergency shut down would be initiated.

1.1.6 Baghouse Filter (with carbon injection) and Plume Suppression

The wet combustion gases from the wet flue gas cleaning will pass through the final tail end flue gas cleaning system prior to discharge. The tail end flue gas cleaning system will consist of a plume re-heater followed by a second stage activated carbon/lime mixture injection and bag house filter. The plume re-heater (plume suppression) will bring the temperature of the wet flue gases from circa 60°C to 100°C to reduce the formation of a visible plume. The plume suppression system is described fully in section 9.5.8 of the waste licence application.

The injection and removal of the carbon/lime mixture will facilitate the removal of trace dioxins, heavy metals and hydrocarbons still remaining in the flue gases. The operation of this second stage carbon/lime injection and baghouse filter is identical to the first stage described above in section 1.1.4 and has been outlined in detail in section 9.5.7 of the waste licence application.

The configuration described above corresponds to "Tail end Flue Gas Cleaning Option 1" as illustrated in figure 9.6 in section 9.5.7 of the application.

1.2 Abatement Of Vent Losses from Bulk Waste Tanks

The vent losses from the bulk waste tanks in the waste to energy plant will be collected in a common header and ducted to the post combustion chamber. In the event that the post combustion chamber is out of service, the vents will be ducted to a back up treatment system. This back up system will be an activated carbon unit. This system is described in detail in section 9.5.9 of the waste licence application.