Attachment H.1: Residual Waste

H.1.1 Pre-Treatment Definition

The EPA Draft Technical Guidance Document *Municipal Solid Waste – Pre-Treatment & Residuals Management* published for consultation on the 22nd September 2008 outlines minimal pre-treatment obligations for waste intended to be accepted at WtE facilities.

This includes a 2 bin source separation or equivalent and the mechanical treatment of the residues that will yield marketable recyclable fractions e.g. metals. Pre-incineration biological treatment of residual waste is not mandatory and is to be decided on a case by case basis having regard to the environmental and economic efficiency of the proposal.

H.1.2 Pre-Treatment Proposal

Indaver Ireland intends to accept only residual waste at the facility in line with the North East Waste Management Plan's policy to:

> *"maximise recycling to the greatest realistic extent and to divert as much residual waste as possible away from landfill through the introduction of thermal treatment"*

where residual Municipal Waste is defined as:

> *"the fraction of municipal waste remaining after the source separation of municipal waste fractions, such as food and garden waste, packaging, paper and paperboard, metals, glass and is usually unsuitable for recovery or recycling."*

It is noted that the pre-incineration biological treatment of residual waste is not included in the plan. This is because the plan provides for:

> *" the introduction of door to door collection of dry recyclables such as paper, plastics, metals etc., increased number of Bring Banks in rural areas alongside new Recycling Centres, in specified towns. Recycling would be further increased by collection of household kitchen waste for biological treatment. The remaining waste, which is combustible, would be thermally treated and the residual waste, which cannot be recycled or thermally treated, would be landfilled."*

It is therefore submitted that the focus in the North East Region is on source separation and that the biological treatment of residual waste, e.g. through mechanical-biological treatment (MBT), is not envisaged.

The North East region has been one of the most successful regions in terms of implementing its waste management plan. Since the first plan was issued in 1999, significant progress has been made towards its goals. Recycling rates have been boosted by the roll out of a three bin collection service in line with the plan's targets. This year, waste collection permits were reviewed and all new or revised permits must now include a condition that waste collectors must provide for brown bin collection. Dry recyclable collection continues to be rolled out. In Meath, 85% of householders signed up to a waste collection service have dry recyclables bins.

Therefore, it is submitted that the pre-treatment obligations for waste accepted at the Meath waste-to-energy facility should comply with the minimum requirements as outlined in the EPA Technical Guidance Document and should not include biological

treatment of residual waste, since there is already provision in the NEWMP provision for a three bin collection system with separate collection and treatment of biological waste.

H.1.3 Residual Waste Modifications

The principle modifications to residual waste definitions approved in Waste Licence 167-1 are outlined in Table H.1.a below.

Table H.1.a: Modifications to residual waste definitions

Aspect	Difference
H.1.1	A definition of residual waste was not given in WL167-1. It is raised here in the context of a recently issued proposed decision on licence WL0232-01. It is proposed that any definition of residual waste for this application should include pre-segregation and sorting as key pre-treatment methods but should not include MBT as a pre-treatment method as it is not part of the Regional plan.

Attachment H.2: Waste Acceptance

H.2.1: Waste Acceptance Procedures

Attachment D.2.2 outlines in detail the waste acceptance protocol. Included in Appendix H1 is a draft waste acceptance procedure, drawn up as part of the QESH management system (see Attachment C.2), for waste acceptance at the Meath waste-to-energy facility.

H.2.2: Waste Acceptance Modifications

The principle modifications to waste acceptance procedures approved in Waste Licence 167-1 are outlined in Table H.2.a below.

Table H.2.a: Modifications to Waste Acceptance Procedures

Aspect	Difference
H.2.1 / D.2.2: Waste Acceptance Procedures	In line with planning permission PL 17.219721, the facility can if required accept waste produced and generated outside of the North East Region on condition that it is in accordance with the proximity principle and Circular WIR:04/05.
	The waste quarantine area has been moved from the reception hall to the service yard in line with the requirement in WL167-1 that no waste should be quarantined in the waste reception/delivery area for the incinerator.
	References to the material recycling facility have been omitted from the draft waste acceptance procedure.

Attachment H.3: Waste Handling

H.3.1 Waste Handling Procedures

Attachment D.2.2 outlines in detail the waste handling protocol. Included in Appendix H2 is a draft waste handling procedure, drawn up as part of the QESH management system (see Attachment C.2), for waste handling at the Meath waste-to-energy facility.

H.3.2 Waste Handling Modifications

The principle modifications to waste handling procedures approved in Waste Licence 167-1 are outlined in Table H.3.a below.

Table H.3.a: Modifications to Waste Handling Procedures

Aspect	Difference
H.3.1 / D.2.2: Waste Handling	The grab cranes can now be operated manually, semi-automatically or fully automatically.

Attachment H.4: Waste Arising

H.4.1 Solid Residues

H.4.1.a Solid Residues Generated

The methods adopted for minimising solid residue production are outlined in Attachment D.1.t.

Appendices H3 and H4 provide details on the expected types and quantities of solid residues from the Meath waste-to-energy facility, based on a nominal operating capacity of 26.7 tonnes per hour of 9.35 MJ/kg waste for 7,500 hours per year. This includes the classification of residues according to the European Waste Catalogue (EWC) and Hazardous Waste List. Residues are only classified as non-hazardous if they do not have the properties listed in H1 to H14 of the *Waste Catalogue and Hazardous Waste List*[1] and Annex III of Directive 91/689/EEC.

Composite samples of bottom ash, boiler ash and flue gas treatment residues will be collected[2] and tested on a quarterly basis for:

- leachability and leachate (total soluble fraction, heavy metals soluble fraction and salts soluble fraction)
- composition
- total organic carbon

It is proposed that the leachability testing be carried out in accordance with the CEN standard EN 12457/1-4 or other standards as required by the EPA.

The leachate test will ultimately determine whether the residue is suitable for reuse or disposal, and if the latter, which type of landfill would accept it. Criteria for waste accepted at inert or hazardous landfills are outlined in the EU Directive 2003/33/EC. There are no EU-wide criteria for the reuse of ash or for waste acceptance at non-hazardous landfill. From experience in other Member States, bottom ash and boiler ash are typically found to be non-hazardous, while flue gas treatment residues are classified as hazardous in line with the EWC.

An example of recent analyses of bottom ash, boiler ash and flue gas treatment residue from a similar Indaver facility in Belgium are attached Appendix H5.

H.4.1.b Storage of Residues

The handling and storage of bottom ash, boiler ash, flue gas treatment residues and ferrous metals has been outlined in Attachment D.2.7.

H.4.1.c Reuse / Disposal of Residues

All residues will be removed by appropriately permitted waste management contractors and sent for reuse or disposal to suitably licensed facilities. Prior to the commencement of operations at the facility, full details of the relevant contractors and facilities will be submitted to the EPA.

[1] based on the EU legislation 2000/532/EC as amended by 2001/118/EC, 2001/119/EC and 2001/573/EC

[2] Sampling will take place over the period of a week, and samples will be sent for compaction and drying before being sent to an accredited laboratory for testing

Bottom Ash

Across the EU, bottom ash is commonly either sent to non-hazardous landfill or is pre-treated to recover components for reuse in the construction or similar industries.

To facilitate reuse, Member States set quality criteria that define the quality of recovered material and the conditions under which they can be reused. Such criteria facilitate the development of markets for treated ash by guaranteeing the quality of the material.

Some examples of these leaching[3] criteria have been outlined in Table H.4.a below. Potential outlets for bottom ash meeting this criteria are generally specified as road bases, parking lots, embankments, foundations and other applications where drainage and liner conditions apply.

Table H.4.a: Selected leaching limit criteria for the reuse of bottom ash

Parameter (mg/kg)	France Batch (L/S=10)	Germany Batch (L/S=10)	Netherlands Column (L/S=0.1-10)	Flanders Batch (L/S=10)
As	<2		7	0.8
Ba			155	
Br			44	
Cd	<1	0.05	0.061	0.03
Co			2.3	
Cr		2	12	0.5
Cr6+	<1.5			
Cu		3	23	0.5
Hg	<0.2	0.001	0.075	0.02
Mo			23	
Ni		0.4	3.5	0.75
Pb	<10	0.5	8.2	1.3
Sb			2	
Se			0.27	
Sn			2.3	
V			95	
Zn		3	14	2.8
F			288	
Cl		2,500	8,800	
SO_4	<10,000	6,000	65,000	

For bottom ash to meet this criteria it must be of a higher grade than if it were to be disposed of in a landfill. This improvement in quality can be achieved by treating the ash in an ash recovery plant, as described in Appendix 5.2 of the EIS.

At present there is no bottom ash recovery plant in Ireland and there are no bottom ash reuse criteria. However, it is the intention of Indaver Ireland to proactively identify potential outlets for bottom ash and to work with the EPA in establishing reuse criteria. With these in place, it may become feasible to develop an ash recovery plant or other pre-treatment system to produce bottom ash components that can be reused.

In the meantime, it is proposed that the bottom ash will be consigned to an appropriately licensed non-hazardous landfill. Pre-treating bottom ash prior to landfill would yield little environmental gain. Exporting bottom ash for recycling would also

[3] Leaching criteria regard the leaching properties of a material when diluted according to a Liquid/Solid (L/S) ratio and test type (batch/sequential/column) specified in the criteria

yield low environmental gain relative to the environmental cost of transportation. In any case, it is unlikely that other countries would accept such shipments since Ireland already has outlets for bottom ash, in the form of landfill.

It is worth noting that the volume of ash produced by a waste-to-energy plant requires significantly less landfill capacity than untreated MSW, which is currently being sent to landfill. Furthermore, bottom ash is more inert than untreated MSW so has less of an adverse impact when sent to landfill.

Boiler Ash

If boiler ash is classified as non-hazardous it could be mixed with the bottom ash for disposal or reuse. If classified as hazardous however, there are limited reuse options. In this case it is anticipated that boiler ash would be exported with flue gas treatment residues to a suitably licensed hazardous waste landfill for disposal.

Flue Gas Treatment Residues

Due to their leachate characteristics, the flue gas treatment residues are likely to be classified as hazardous waste. Although the International Solid Waste Association (ISWA) has identified some reuse options for flue gas treatment residue, Indaver NV considers it more environmentally preferable to concentrate and isolate such hazardous material from the environment through safe disposal.

It is proposed that in the short-term, the flue gas treatment residues will be exported to a licensed hazardous waste landfill or salt mine. Although it is an objective of the EPA National Hazardous Waste Management Plan (2001) and the draft EPA National Hazardous Waste Plan (2008) to develop hazardous waste landfill capacity in Ireland, there is currently no such capacity. Under these circumstances, it is reasonable to assume that other countries will assist Ireland with this problem. It is not envisaged to solidify or otherwise pre-treat the residues prior to export, as this would only increase their overall mass and volume and the environmental impact of their transport. Instead, Indaver will ensure the receiving landfill subjects the residues to a suitable pre-treatment, in line with EU landfill acceptance criteria, prior to disposal.

Alternatively, in line with Council Decision 2003/33/EC and the EWC[4], it is possible to landfill solidified residues as non-hazardous waste or solidified hazardous waste in existing non-hazardous landfills. Should this option become available in Ireland, subject to discussions with the EPA, solidification of residues may take place onsite prior to transport within Ireland.

Indaver Ireland has over 20 years of experience sourcing suitable outlets, both in Ireland and abroad, for the disposal of hazardous waste. Indaver also operates its own hazardous waste landfill in Antwerp, Belgium. It is the policy of Indaver Ireland to approve waste facilities before sending any material to them the first time in line with the company's internal procedure *Operations 11.2 Approval and Monitoring of Waste Facilities*. To obtain approval, waste facilities must prove that they have the relevant legal licences and/or permits, adequate insurance and operate within their legal operational parameters.

Recovered Metals

Ferrous metals recovered from bottom ash will be sent off-site to an appropriate and licensed recycling facility. It will not be possible to recover non-ferrous metals unless

[4] European Waste Catalogue

an ash recovery plant is developed. This is because a non-ferrous metal recovery system requires a homogeneous, dry, evenly distributed layer of ash to be spread on a conveyor belt, which is difficult to achieve without pre-treating bottom ash. As less than 1% of the metal in the input waste will be non-ferrous, the effort required to present bottom ash in this manner does not outweigh the environmental gain. This is further explained in Section 5.7.2 of the EIS.

As previously mentioned, Indaver intends to proactively identify opportunities for the development of an ash recovery plant in Ireland.

H.4.2 Other Wastes

Other wastes arising from the facility will include minor quantities of waste from facility operations and staff and visitor facilities. These are listed in Table H.4.b.

Table H.4.b: Other wastes arising

Waste	EWC Code[5]	EWC description	Description and quantities	Handling, Reuse and Disposal
Waste hydraulic oil	13 01 10 13 01 11 13 01 12	Mineral-based non-chlorinated hydraulic oil Synthetic hydraulic oils Readily biodegradable hydraulic oils	Used oil from the lubrication and cooling of moving parts throughout the waste-to-energy plant. Arising in minor quantities only.	Waste oils will be stored in a properly bunded area and sent offsite for recycling.
Petrol interceptor residues	13 05 06 13 05 07 13 05 02	Oil from oil/water separators Oily water from oil/water separators Sludges from oil/water separators	Residues such as grit, stones or oily water removed from petrol interceptors during regular inspections. Arising in minor quantities only.	Oily water and sludges will be stored in a properly bunded area and sent offsite for recycling.
Electrical and Electronic Equipment	16 02 14	Discarded equipment other than those mentioned in 16 02 09 to 16 02 13	Redundant items of equipment from the plant arising in minor quantities	Discarded equipment will be either be sold on if in good condition, or will be sent offsite to be scrapped for parts or for disposal to an appropriately licensed facility.
Kitchen waste	20 01 01 20 01 02 20 01 08 20 01 25 20 01 39 20 01 40	Separately collected: Paper and cardboard Glass Biodegradable kitchen and canteen Edible oil and fat Plastics Metals	Wastes arising from the canteen and kitchen catering for approximately 50 onsite staff. Arising in minor quantities only.	Where possible, biodegradable waste will be composted onsite or sent offsite for composting. Otherwise, it will be sent to the waste-to-energy facility for treatment. Separately collected recyclable waste such as glass and plastics will be sent offsite for recycling.
Office waste		Separately collected:	As there will be approximately 50	Separately collected recyclable waste

[5] European Waste Codes are detailed in the EU Directive 2001/118/EC, List of Wastes

	20 01 01 20 01 21 20 01 29 20 01 30 20 01 33 20 01 35 20 01 39 20 01 40	Paper and cardboard Fluorescent tubes and other mercury-containing waste Detergents containing dangerous substances Detergents other than those mentioned in 20 01 29 Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components Plastics Metals	onsite staff, minor quantities of office waste are expected.	such as paper, electronic equipment, etc. will be sent offsite for recycling where possible. Any materials that cannot be recycled e.g. detergents will be sent offsite for disposal at appropriately licensed facilities.
Waste from landscaping	20 02 01 20 02 02	Biodegradable waste Soil and stones	Garden and green waste from onsite landscaping will be expected in minor quantities.	If possible, garden and green waste will be composted onsite or sent offsite for composting.
General waste	20 01 38	Wood other than that mentioned in 20 01 37	Pallets from the delivery of equipment will occur in relatively minor quantities.	Where possible materials such as wood waste will be sent for recycling. Otherwise it will either be sent to the waste-to-energy plant or removed from site by appropriately permitted waste contractors.

H.4.3 Modifications to Wastes Arising

The principle modifications to wastes arising approved in Waste Licence 167-1 are outlined in Table H.4.c below.

Table H.4.c: Modifications to Wastes Arising

Aspect	Difference
H.4.1: Solid Residues	The expected quantities of residues arising has increased by approximately 23,000 tpa in total, with bottom ash production increasing by 20,000 tpa, flue gas treatment residues by 6,000 tpa, boiler ash production decreasing by 500 to 1,500 tpa and gypsum (previously estimated at 1,000 tpa) no longer being produced. The expected quantities of ferrous metals to be recovered have increased by approximately 2,900 tpa. The composition of flue gas treatment residues will be slightly different, with more spent expanded clay and less spent activated carbon.
	An up to date analysis of ash residues from the Indaver facility in Belgium has been included. The proposed leaching test has been changed to reflect the development of CEN standards.
	Since the previous application, Council Decision 2003/33/EC was issued providing for inert and hazardous landfill waste acceptance criteria. Many Member States have also updated or developed leaching criteria for the reuse of bottom ash.