Sub 17

Ann Kehoe

Subject: FW: Indaver Ireland
Attachments: EPA210313.docx; EPA Appendix 1.docx; Appendix 2 - 2012-08-30 - EURITS LEGAL prof Beckmann.pdf; Appendix 3 Sakab correspondence and translation.docx; Appendix 4 OKOPOL .pdf; Appendix 5 Waste Acceptance criteria of AEB.pdf; Appendix 6 Waste Acceptance for KWA.pdf; Appendix 7 Prof Broderick report to ABP.pdf

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From: Mullins, Kieran [mailto:Kieran.Mullins@veolia.ie]
Sent: 21 March 2013 14:46
To: Aoife Loughnane
Subject: Indaver Ireland

Dear

Please find enclosed a submission from Veolia Environmental Services TS Ltd., in relation to the application by Indaver Ireland Ltd. to amend its Waste Licence.
There are several documents attached.

1) Submission
2) Appendices

Appendix 1 - Danish Municipal Solid Waste Incinerators with R1 status. Danish Ministry of the Environment (Environmental Protection Agency). June 2011.

Appendix 2 - 'Recovery' in European Waste Law and its Importance to the Operation of Waste Facilities. Legal Opinion at the Request of EURITS. Prof. Dr. Martin Beckmann. (Honorary Professor at the University of Münster). Münster, August 2012.

Appendix 3 - Letter from Sakab (and translation) to Authorities re-R and D codes and subsequent reply and translation.

Appendix 4 - Brief expertise on the application of the energy efficiency formula of Annex II of the Waste Framework Directive 2008/98/EC and potential adverse effects Final report, July 2009. Okopol.

Appendix 5 – Waste Acceptance criteria of AEB.

Appendix 6 – Waste Acceptance criteria of KWA.

Appendix 7 – Prof. Broderick Report to An Bord Pleanala.

Yours Sincerely

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Submission to the Environmental Protection Agency with respect to the Proposed Amendments to the Existing Waste Licence for the Waste to Energy Plant at Carranstown, Duleek, County Meath by Indaver Ireland Ltd.

Licence Reference : W0167-03

Submitted By:

Veolia Environmental Services Technical Solutions Ltd.,
Corrin
Fermoy
Co.Cork.

Date: 20/03/2013

1.0 Introduction

Indaver Ireland Ltd, having only commenced receiving and incinerating municipal waste since September 2011 at their facility in Duleek, has submitted an application to the Environmental Protection Agency for a review of the Waste Licence W0167-02 to enable them to make Amendments to the Waste to Energy Plant at Carranstown, Duleek, County Meath.

Veolia Environmental Services Technical Solutions Ltd (VESTS) is objecting to the application for,

- An increase of annual throughput by 20,000 tonnes per annum.
- The inclusion of additional EWC Codes (hazardous and non-hazardous).
- Future additional capacity ammonia storage tank and fuel oil tank.

This document outlines VESTS concerns, the basis of these concerns and subsequent objections to the granting of the requested amendments.

VESTS is of the opinion that the applicant has not demonstrated adequately the need for the increase in the tonnages nor has the applicant justified the reason for the additional EWC codes. It is apparent that this is a "catch-all" application to allow the facility to incinerate large variations of waste types, including hazardous waste, which has not given due consideration to the infrastructure required for the acceptance, handling and management of these waste types. Furthermore, the applicant has not carried out a proper site selection survey. Finally, the applicant has not adequately addressed the potential increase in traffic volumes.

2.0 Veolia Environmental Services

Veolia Environmental Services Technical Solutions Ltd. (VESTS) is a subsidiary of the waste management division (Veolia Environmental Services (VES)) of the Global multi-utilities group Veolia Environnement (VE).

VES is a world leader in the operation of incineration and energy recovery facilities. It operates 68 municipal incinerators, processing 10,000,000 tonnes of waste and 23 hazardous waste incinerators, processing 975,000 tonnes of hazardous waste worldwide. As operators of these facilities VES understands the critical issues associated with the waste handling, combustion, technical operation and environmental performance of both non-hazardous and hazardous waste incinerators.

In Ireland VESTS operates a Solvent Blending Plant and Hazardous Waste Transfer and Recovery Facility in Fermoy, Co. Cork under Licence W050-02 issued by the EPA.

3.0 Objection to Tonnage increase from 200,000tpa to 220,000tpa including hazardous waste.

The applicant has requested that an additional 20,000tpa of waste be permitted into the facility with the objective of making up for a shortfall in calorific value of the feedstock.

VESTS's objection to this increase in tonnage is on the following grounds: -

1. The applicant has failed to justify why the additional tonnage will make up the shortfall in thermal capacity.

2. Throughout the Environmental Impact Statement and the Waste Licence Application the applicant constantly contradicts itself as to why it needs this increase in tonnage.

3. In the Waste Licence Application the applicant has requested that the upper limit of 50,000 tpa restriction on EWC Code 19 12 12 be removed, and to have it listed alongside Non-Hazardous residual municipal waste, as there are large quantities of this material available in the market with very limited treatment options. This material is generally known as SRF or RDF in the waste industry. VESTS objects to the increased use of SRF/ RDF as it will only be used to cancel out the negative calorific value of aqueous wastes and will in fact divert materials from a higher tier on the waste pyramid to a lower tier.

There are no longer limited treatment options with respect to SRF or RDF in the market. It is a well-known fact both to the market and the applicant that the cement industry is utilising this material as a substitute fuel for the past few years in Ireland and internationally for several years and continue to increase the throughput volume.

It is also worth noting that the calorific value of this material is significantly higher than that of residual waste. The typical CV of this material is normally to be found in the region of 16 – 20MJ/kg. Thus, by increasing the volume of this material through the incineration facility it is obvious that less of the lower CV type waste would be required to achieve the average CV of 9.35MJ/kg required and the subsequent optimum thermal output. VES suggest that the requested increase in this higher CV material is to allow the applicant to accept lower CV material so that the thermal capacity of the plant can still be attained even when burning water.

The applicant states that a principal reason for submitting the application to introduce additional waste streams to the existing licence is to increase the calorific value (CV) of the

waste mass to reach full thermal capacity of the facility. However, many of the numerous waste streams listed will in fact reduce the CV of the waste. Moreover, in many cases the calorific value for those wastes is below the value which is required for self-sustaining combustion or which would be sufficient to achieve an R1-status in a mono-combustion plant for such waste. In addition, in Section 2.2.5 of the EIS the applicant states that it may in the future incinerate waste oil to compensate for the low CV waste.

For example, aqueous waste streams generally have a CV closer to zero MJ/kg and non-dried industrial/ sewage sludges have CV's averaging c.6.5MJ/kg. The introduction of these lower CV waste streams (aqueous wastes, sludges) will actually lower the average CV of the waste stream. Throughout Europe municipal (non-hazardous) sewage sludge is sprayed only onto the grates of municipal incinerators with one of the consequences being that it lowers the temperature on the grate, reduces the average CV of the waste and frees up additional capacity. Hence, the argument that waste of this nature should be introduced cannot be justified from the viewpoint of trying to increase the average CV of the waste and the resulting thermal capacity. The aqueous streams referred to here are listed in Table 2.1 of the EIA and are shown below.

EWC	Example of Material	Industry source
070701*	Water from a spill clean up containing trace oils and adhesive powders	Manufacturers or users of organic chemicals
080308	Waste Ink Solution (Water and non-hazardous Ink Solids), paint and water	Manufacturers or users of paints and inks
200128	Water based paint from Civic Amenity Sites	Municipal/ Industrial/Commercial Waste
070501*	Rinsewaters containing trace pharmaceutical residues	Pharmaceutical manufacturers or users
160507*	Toilet bowl or other cleaners, detergents, etc.	All Industry

The applicant proposes that the aqueous waste will be directly injected into the furnace. Article 3, paragraph 15, of directive 2008/98/EC states: "recovery" operation means any operation the principal result of which is waste serving useful purpose by replacing other materials which would otherwise have been used to fulfil particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations. **As discussed above this aqueous waste has no thermal value, is not replacing other materials and burning it directly in a furnace**

serves no other function other than to incinerate it. This operation is classified throughout Europe as "incineration on land" – D10 .

With regard to the Proximity Principle, if Indaver claim that the facility is R1 (i.e. Recovery) then the Proximity Principle is not applicable for hazardous waste. Therefore justification for the facility on the grounds of proximity is not relevant. However, were the facility to be a D10 facility then Proximity is valid.

4. The Indaver application is for an R1 facility only.

Annex II of 2008/98/EC lists all recovery operations and in particular:

"R1 Use principally as a fuel or other means to generate energy(*)

(*) This includes incineration facilities dedicated to the processing of municipal solid waste only where the energy efficiency is equal to or above:

— 0,60 for installations in operation and permitted in accordance with applicable Community legislation before 1 January 2009,

— 0,65 for installations permitted after 31 December 2008,"

Waste related activities are classed as recovery (R) or disposal (D) as defined in the Waste Framework Directive (2008/98/EC). Under the third schedule of the Waste Management Act 1996 – 2011 the most appropriate classification for an operation such as the incineration of aqueous waste is D10 "Incineration on land". The applicant has not applied for this class of activity. Moreover, permitting this operation is contrary to the overall concept of the facility which is recovery (R1). Hence, it is contended that the incineration of the low CV material is a D10 operation which the applicant is proposing will co-exist with the R1 operation. As stated earlier the applicant has not applied for D10 and should not be permitted to carry out this operation at the facility.

The "Guidelines on the Interpretation of the R1 Efficiency Formula for incineration facilities" (The R1 guidelines are not legally binding, but it is expected that Member States will apply them. A court would also consider them as indication for interpretation of the application of the R1 formula.) recommend that the calculation be made after 1 year in normal operation conditions on the basis of annual data. The Indaver calculation was based on a period of less than one year and extrapolated. This has indicated a potential R1 efficiency for the plant of 0.68 – as opposed to a threshold level of 0.65. This is not well above the R1 threshold in order to be able to compensate for a modification in the conditions of the operation – as recommended in the guidelines.

The guidelines further state that "Hazardous waste is usually treated in the most appropriate way in incinerators specifically dedicated to the treatment of hazardous waste which are not under the scope of the R1 formula". Moreover, it states that "authorisation of any waste input except for mixed municipal solid waste shall be in line with BREF on waste incineration....." It should be noted that these guidelines were welcomed by CEWEP (Confederation of European Waste to Energy Plants) to which Indaver are the most prominent member in Ireland. CEWEP represents 363 of 440 Waste-to-Energy Plants from European countries and one from the USA.

The Indaver Group is also prominent member of Eurits (European Union for Responsible Incineration and Treatment of Special Waste) with a senior employee sitting on the main committee. Eurits, the European Union for Responsible Incineration and Treatment of Special Waste, represents more than 90% of the EU's specialist waste incineration sector, and exists to ensure the safe, legal and environmentally sound incineration of waste. The organisation was established in 1994. . The 26 members operate 36 plants in 12 countries with a total workforce of more than 4,500.

In June 2010 Eurits issued a position paper on the European Commission's draft guidance on the application of the R1 energy efficiency criteria to municipal waste incinerators **(R1 criteria guidance – Eurits response, June 2010).** In particular it states how hazardous waste should be treated in these calculations. "Eurits believes that the most appropriate management for hazardous waste is in a dedicated, high temperature facility with characteristics as described in the WI BREF. In addition the nature of a high temperature incinerator is to ensure greater destruction efficiency and burn out of materials than is the case for MWIs. It goes on to say that "MWIs that incinerate hazardous waste **(i.e. as D10)** should still have to comply with all the legislation and regulation of the design, monitoring and controls that a HW incinerator has to undertake. These controls should apply to ALL the waste the MWI is taking if it is combining hazardous waste with municipal waste". Finally, Eurits recommend that "Hazardous wastes would not count for formula calculations (input and output) and hazardous wastes would be D10 if used in MWI."

Beckmann (Appendix 2), in his paper of August 2012, gave a legal opinion on "Recovery in European Waste law and its Importance to the Operation of Waste Facilities". He concluded that the Commission of the European Communities "determines that this classification (R1) includes facilities dedicated to the processing of **municipal solid** waste only where their energy efficiency is equal to or above one specific parameter.

According to its wording, this formula is valid only for incinerators. In addition, its applicability is limited to solid municipal waste. Only if the purpose of an incinerator is the treatment of this waste one can apply the R1 formula".

Beckmann continues to say; -"On p6 ("Guidelines on the Interpretation of the R1 Efficiency Formula for incineration facilities") it says that the 'R1 formula' is a performance indicator for the level of recovery of energy from waste in a plant dedicated to the incineration of municipal solid waste (MSWI). Annex II footnote of the WFD would clearly restrict the scope of the formula to MSWI. If the installation in question is not an incinerator or if the incinerated waste is not municipal waste, the R1 formula is not applicable."

It is noted that the applicant, in their Article 12 response, listed AVR, AEB, KWA, SAKAB and Ekokem as examples of facilities with R1 status that also accept hazardous waste. All of these facilities were accepting hazardous waste well in advance of receiving the R1 code and before the guidelines were issued. None of these facilities are new when compared to the facility operated by the applicant. In the case of AVR and AEB, the Dutch government fast tracked the R1 status of these facilities in 2009 before the Waste Framework Directive 2008(2008/98/EC) was to be brought into law in the Netherlands in December 2010, and the subsequent guidance documents issued by the EU in 2011. This was done as part of an agreement with the incinerator operators where there would be no expansion in the Netherlands' capacity for waste incineration until 1 January 2020. By giving these plants R1 status they would become waste recovery plants, which would make it easier for them to source and accept waste for incineration from other countries. Moreover, it should be noted that AEB have a dedicated hazardous waste handling facility on the site. In addition, the waste acceptance criteria of AEB are more stringent that proposed by Indaver (see appendix 5). As an example, they do not allow waste that is highly toxic, strongly odourous, demonstrably carcinogenic, pH between 5-9, non-dusty during off-loading and handling, etc).

With reference to the use of AEB by Veolia, please be advised that this was used once on a trial basis. Following review Veolia no longer utilises this facility.

KWA is an integrated waste management facility located in Germany with many processes. The R1 code for the incinerator was granted before the guidelines on R1 Interpretations were published. However, it is noted in their waste acceptance criteria (along with other limiting parameters) that waste must have a CV of > 11Mj/kg for energy recovery to be considered for

that waste(appendix 6). Furthermore, when one looks through the EWC codes that Indaver have applied for and compared with those accepted at KWA - more specifically the low CV material, it is noted that none of these low cv materials are accepted at KWA for incineration (eg. 070101*, 070501*, 070511*, 070513*, 080308, 160507*, 060508*, 060303*, 050110*, 090811*, 091003*).

It is worth noting that, in France, from the 1st of January 2013, for energy recovery status to be granted from the incineration of hazardous waste the CV of the hazardous waste must be equal or greater than 10.467MJ/kg.

Sakab is located on a fully functional hazardous waste management facility that has the complete infrastructure (laboratory, storage areas, quarantine areas) and skilled personnel to accept, test, handle and treat hazardous waste. In addition all ash from the incinerator goes to a hazardous waste landfill. It is also interesting to note that Sakab have R1, R12 and D10 as the codes for their incinerators. Sakab have in a letter sent to the authorities in June 2012 stated: "Incinerated waste containing no energy, such as waste water, soils and other inorganic material is considered to be D10". (see appendix 3). Finally, Sakab, with respect to the application of the R1 status state the same letter to the authorities: "The Waste Directive Annex 2 provides a formula to calculate the energy efficiency of an incinerator for municipal solid waste to determine whether the facility can be given an R1 code. If using the calculation formula for SAKAB combustion plants (**although the formula is only meant to be used for municipal solid waste**) both plants meet the criteria". This was formally accepted by the authorities.

Ekokem does not have formal R1 status although the facility has sufficient energy efficiency. As with Sakab the facility is located on a hazardous waste facility that has the complete infrastructure to accept and treat hazardous waste. They do not burn toxic waste such as API residues nor do they burn aqueous hazardous waste in their non-hazardous waste incinerator. In Finland the authorities have commented that hazardous waste imported to Ekokem is done so for final disposal due to the hazardous properties of the waste and not because of the energy content. Therefore, for all hazardous waste imported from abroad the D10 code remained.

The Ekokem municipal waste facility may be classified R1 as the energy efficiency of the plant fulfils the requirements of the WFD however, new waste laws in Finland came into in

force May 1st, 2012, and as of yet there are not procedures in place as to how the status for R1 will be retained.

The Danish Environmental Protection Agency in June 2011confirmed that the R1 classification for incinerators (see attached) "applies only so far as the plants incinerate non-hazardous waste. Incineration of hazardous waste, either in MWS incinerators or in plants dedicated to the incineration of hazardous waste is still considered a D10 operation"(Appendix 1)

Curiously the Indaver facility in Flanders is not listed as an R1 facility. Why is this? Surely if Indaver wish to pursue this status for their Irish operation it is in their interests to do so for their Belgian operation....!

If it is agreed by the EPA that the proposed incineration of the hazardous waste in this facility is not a R1 operation and is in fact a D10 operation then the application to accept hazardous waste will have to be refused as the applicant did not make an application for a disposal operation. Furthermore, if it is agreed by the EPA that the proposed incineration of wastes that do not have sufficient calorific value to sustain self-combustion is a disposal (D10) operation then permission to have low CV wastes will have to be refused as the application made by Indaver did not apply for a disposal operation.

The applicant has stated that screening of the wastes will be completed to ensure that the waste streams will have a known calorific value range. Based on the application and subsequent information this appears to be between 0 and 30MJ/kg. It is incumbent on the applicant to state what the precise range of CV the material they wish to incinerate at the facility should have.

The application does indicate that up to 15,000tonnes of hazardous waste would be accepted at the facility were permission granted. Bord Pleanala has granted them permission to accept 10,000tonnes. The applicant has listed the EWC codes for the hazardous waste it wishes to accept but does not indicate the tonnages of each that it expects to receive. Conceivably the facility could therefore accept up to 10,000tonnes of one waste type – for instance the aqueous waste streams (EWC 070501*). This would equate to receiving c. 5% of the waste on-site with a CV close to zero(in-fact with the 10,000tonnes already licenced this could be up to 20,000tonnes or 10% of the total waste volume) . Firstly, as mentioned previously, this aqueous waste could not be considered to be helping to counteract the deficiency in the CV of waste as currently reported. As the current CV is 8.0MJ/kg

and the CV of the aqueous streams is close to zero the incineration of this aqueous stream at high volumes would reduce the average CV to c.7.3MJ/kg, somewhat lower than the required 9.35MJ/kg. (Note: These calculations exclude the fact that up to 10,000tonnes of non-hazardous aqueous waste can also be accepted which would further reduce the CV of the waste). Secondly under the Waste Incineration Directive (WID) the operator is required to maintain the minimum temperature of 850°C under the most unfavourable conditions. This is taken to mean the most unfavourable operating conditions i.e. at the edge of the operational process design envelope and it requires the operator to understand their waste stream and its impact upon their plant. As a result at the design stage, the operator should have taken into account the potential nature of the wastes to be accepted at the facility including the heterogeneity (e.g. CV, moisture content ranges) and must be able to demonstrate that they have adopted a sufficiently wide process envelope. As the original facility was designed as a municipal waste incinerator it is unlikely that consideration was given to the plant incinerating 10,000 tonnes of hazardous aqueous waste per annum plus a possible 10,000 tonnes of non-hazardous aqueous waste already licenced, and, the corresponding impacts this would have. Did the operator take this possible level of aqueous waste into consideration at the design stage? If so the operator must demonstrate that they have designed the plant accordingly.

In section 2.2.5 of the EIS the applicant has stated that it wishes to add additional fuel oil tanks which may be used to store waste oil, which may be burnt to balance with the burning of low CV waste. This reaffirms the intention of the applicant to utilise the facility to incinerate large volumes of aqueous/ low CV waste as this would be standard practice in a hazardous waste incinerator where there is a requirement for CV rich material to offset the lower CV material.

VES would therefore contend that the request to increase the tonnage throughput at the facility from 200,000tpa to 220,000tpa should not be granted as the applicant has not justified their reasons for increasing this tonnage. Furthermore, it is contended that additional aqueous waste and/or wastes with low CV's should not be allowed to be incinerated at the facility, as it would in effect be changing the nature of the Indaver facility from a waste to energy (R1 recovery) installation to an incinerator with a significant disposal function (D10).

4.0 Objection to the request for the deliberate acceptance of Hazardous Waste at the facility.

The applicant intends that up to 15,000 of the 20,000tpa additional tonnages be made up of wastes classified as hazardous because of the physical and chemical nature of the material. Planning permission has now been granted for them to accept up to 10,000tonnes of hazardous waste. The applicant states that the majority of these hazardous wastes are already inadvertently accepted on-site as they mixed in with the general municipal waste. This may be true for very small volumes of paint tins, rags and wipes contaminated with paints or oil which in reality could only amount to less than c.25tpa otherwise their current waste acceptance and inspection procedures are insufficient. However, it is certainly not true for the hazardous waste listed in the table below as requested by the applicant.

EWC	Example of Material	Industry Source
170204*	Wood from dismantled warehouse contaminated with creosote or other preservative	Construction and Demolition Projects
150110*	Plastic Jerricans previously containing cleaning agents	All industry that uses pacakaging
170903*	Construction and Demolition waste such as window frames from a pharmaceutical building – may contain trace pharmaceutical powders	Construction and Demolition Projects
*170505**	*Dredging Spoil from firewater retention ponds*	*Construction and Demolition Projects*
*170503**	*Stones and soils from clean up operations resulting from building foundations where possible contamination has occurred (e.g. on pharma site – old building)*	*Construction and Demolition Projects*
180103*	Medical /Infectious Wastes from Clinics, nurses stations etc	Healthcare industry, users of healthcare/ diagnostic/ research products.
130701*	Waste fuel oil and diesel	Manufacture/ supply, use of oils and fuels.
*070701**	*Water from a spill clean up containing trace oils and adhesive powders*	*Manufacturers or users of organic chemicals*
*070511**	*Waste water treatment sludge from pharmaceutical plant – trace powders may be present*	*Pharmaceutical manufacturers*
191206*	Wood(treated) from Waste Management facilities	Waste Management facilities

*070501**	*Rinsewaters containing trace pharmaceutical residues*	*Pharmaceutical manufacturers or users*
*191303**	*Sludges from Soil remediation – e.g. illegal dumping clean-up*	*Soil and Groundwater remediation projects*
191211*	Shredded paint buckets and cans – contents previously pumped off and packaging shredded	Waste Management facilities
191003*	Material from shredding of white good (after recycling) may contain some trace hazardous materials such as plastics with brominated flame retardants.	Waste Management facilities where there is metal shredding.
*190811**	*Waste water treatment sludge from local authority treatment plants where possible contamination may have occurred.*	*Waste Water treatment Plants.*

Note: Items in italics have zero or very low calorific value.

These wastes are normally sent to dedicated hazardous waste incinerators with the appropriate waste acceptance, pre-treatment and incineration facilities.

The applicant has gone on record at the recent An Bord Pleanala oral hearing as saying that the wastes were really meant to be similar in relation to the CV of municipal waste. Again it is clear that this is not the case for aqueous wastes. Whichever reason the applicant prefers to use it cannot be said that the wastes in the table above are similar to municipal waste.

As illustrated above the application proposes a number of hazardous and mirror entry waste streams for acceptance at the municipal incinerator. The examples only show one type of waste associated with the EWC codes and claims that these waste streams are only low level hazardous waste. It is worth noting that EWC codes merely refer to the process from which waste materials have arisen. They do not provide a full chemical composition, complete physical properties or highlight the hazards associated with the wastes. The EWC codes that the applicant has applied for can also cover waste streams that are mutagenic, carcinogenic, ecotoxic, and toxic for reproduction amongst others. As mentioned earlier, Veolia finds it difficult to accept that some of the EWC codes applied for could be considered municipal waste. Granting permission to accept the EWC codes listed effectively gives Indaver "carte blanche" to accept any waste type they choose to accept under that EWC code, despite their claim of having appropriate Waste Acceptance Procedure, and does not just mean waste similar to the examples provided. For example, Clinical waste with code 180103* could also include Liquid and solid cultures and biological agent stocks, limbs, organs, biopsies, tissue samples, HEPA filters

from laboratories, and discarded clinical specimens and consumables. Peaks and variability in contamination in these streams are very common. It is not sufficient to state that the waste streams associated with the EWC codes are going to have low level contamination present. In fact the applicant will have no idea of the contamination level of the waste streams before they arrive on-site unless they carry out a detailed analysis.

Furthermore, Professor Broderick in his report to An Bord Pleanala stated;

"**The use of EWC codes does not appear to be a good method of regulating this approach (*limiting hazardous waste types*)**, which may rely excessively on operator judgment and ongoing decision-making by the facility staff. While good practice and training can ensure that only suitable waste types will be generally accepted, the reliability of this approach and the associated risks have not been established. In addition, in the absence of a definitive list of the waste types deemed suitable for processing, or a comprehensive set of acceptance criteria, the associated environmental impacts are difficult to evaluate."

No matter how Indaver dress up this application they are applying to operate a hazardous waste incinerator. Hazardous waste is classified as hazardous because it poses a risk to human health and the environment. For this reason it is essential that it be managed at a dedicated facility by the technology and procedures specifically designed for hazardous waste.

Wastes classified as hazardous are considered to display one or more of the properties listed in Annex III to Directive 91\689\EEC.

Throughout the application and EIA the applicant refers to the hazardous waste it wishes to be permitted to receive on-site as been low level hazardous waste. What the applicant has not done is state at what level of contamination the hazardous waste is no longer low level hazardous waste and will be rejected. If a waste is classified as hazardous it is hazardous.

Indeed it is contended that the applicant cannot delineate between low level and non-low level hazardous waste as there is no legal definition for so called "low-level" hazardous waste documented in legislation and literature. As such prudence and caution and the "precautionary principle" is the best solution and the applicant should not be allowed deliberately accept hazardous waste into the facility for incineration as sought in the application.

5.0 BREF

The question has to be asked whether the acceptance of both hazardous and non-hazardous waste into this facility is best practice. Contrary to Indaver's comments the general consensus that is prevailing throughout European Waste Incinerator Operators and legislators is that hazardous waste should not be co-incinerated in a non-hazardous waste incinerator. Proper waste management encourages the segregation of hazardous and non-hazardous waste early in the waste management system, before collection. This proposed facility has the potential to encourage the mixing of hazardous waste with non-hazardous waste amongst waste producers which is contrary to regulations, guidelines and good management practices. The argument made for self-sustainability in waste management should not be allowed to compromise Best Practice.

The Indaver facility is a new modern MSW incinerator promoting BREF. Other facilities in Europe that are carrying out this activity are long established and in-situ carrying out his activity before the recent R1 guidelines were developed. For waste management to move forward it is not appropriate to copy the older facilities in operation. It is more appropriate to set the standards to the highest levels and meet them. For instance in France, from the 1st of January 2013, for energy recovery status to be granted from the incineration of hazardous waste the CV of the hazardous waste must be equal or greater than 10.467MJ/kg.

If Indaver were to add the hazardous waste straight into the pits, or hazardous liquid waste directly into the furnace, it does not stop this waste from been hazardous. All the waste in the pits would have to be incinerated in accordance with the requirements for the incineration of hazardous waste as laid down in WID and comply with the requirements of WI BREF. The WI BREF specifies BAT for the incineration of hazardous waste including requirements on analytical capabilities, mixing, blending or pretreatment of waste, feed systems for solid waste, injection systems for liquid waste, combustion chamber design and minimum CV or operating temperature requirements. Specific BAT for hazardous waste incineration specifies the "use of a combustion chamber design that provides for containment, agitation and transport of the waste" (the example given is rotary kiln, either with or without water cooling).

Moreover, in the event that the facility ceased operation due to unforeseen circumstances, all waste in the pits would have to be removed to a hazardous waste treatment facility. This would not be an easy task.

The Waste Framework Directive the footnote to the R1 formula states that "the formula shall be applied in accordance with the reference document on Best Available Techniques for Incineration."

Section 5.4 of the waste incineration BREF specifies specific BAT for hazardous waste incineration including:

- Analytical capabilities
- Mixing, blending or pre-treating of waste
- Feed systems for solid waste
- Injection systems for liquid waste
- Combustion chamber design
- Minimum CV or operating temperature requirements

It appears that the applicant considers that there will be no risk associated with the proposed activities. For reasons detailed earlier it cannot be considered a low risk facility and VES would have expected these issues to be addressed in detail in the application. For instance would the applicant propose to accept the liquid waste in drums, IBC's, or bulk iso-tankers(waste similar to municipal waste doesn't normally get delivered in ISO Tankers). Each would require a different injection system and storage and handling of these materials on-site would also be different. The applicant has not discussed this for this waste type and other proposed wastes. There does not appear to be any allowance made for containment of these materials in segregated areas, etc.

Analytical Capabilities

Peaks and variability in contamination in the hazardous streams listed (EWC codes rather than the examples) are very common and therefore necessary upstream controls in terms of acceptance criteria are essential (including Cl analysis to ensure that the operating temperature of 850°C is sufficient to comply with the Waste Incineration Directive, WID).

The facility therefore should be fitted with a laboratory capable of analysing incoming waste streams. In general equipment is required to test:

- the calorific value
- the flashpoint
- PCBs
- Halogens (e.g. Cl, Br, F) and sulphur

- heavy metals
- waste compatibility and reactivity

Without analytical capabilities there is no control on incoming waste and no opportunity to address the risk associated to variability in the waste and incompatibility of waste streams.

Mixing, Blending, Pre-treatment of waste.

Missing from the application are the risks associated with the handling of hazardous waste in the bunker. There appears to be no control on the impact these waste streams will have on the operation of the plant, combustion, air emissions, residue quality or compliance with the Waste Incineration Directive. The applicant currently has an odour issue relating to the waste types it takes in at present and has not as of yet resolved the issue. The possible introduction of vapours from hazardous wastes is going to further compound this issue.

There appears to be no provision for additional waste reception, storage and quarantine of off-specification waste. All the facilities that Indaver mention in their correspondence with the EPA have these and do just tip the waste into the pits without proper assessment. Considering the waste streams targeted include those containing VOCs, heavy metals, persistent organic pollutants, flammables etc. controls around waste reception and provision for storage and segregation of these streams is crucial.

The documents imply that the hazardous liquids will be directly injected onto the grate and hazardous solids tipped into the existing tipping bunker. Even if the laboratory was capable of carrying out the required analysis there would be no opportunity for analysis of the materials and segregation of incompatible streams prior to combustion with the lack of dedicated and bunded waste reception, storage and quarantine infrastructure. Although it is claimed that the applicant will have prior knowledge of the waste delivered to the facility it is a well known fact that before any hazardous wastes are mixed or added to the incinerator that a completed analysis to determine the suitability and compatibility of the wastes should be carried out. Furthermore, it is common that samples collected by customers are not always representative of the actual waste stream.

There is no proposal to pre-treat or homogenise the hazardous waste streams prior to tipping in the existing municipal waste bunker or direct feeding onto the grate.

As stated above, waste streams categorised under the listed EWC codes in the application are highly variable and it is highly unlikely that there will be a steady feed of wastes with similar chemical

composition and physical characteristics. This will lead to spikes in contamination in the waste and ultimately spikes in emissions to air and composition of residues (see later). It is also likely that there will be an impact on the combustion leading to problems with carbon monoxide due to incomplete combustion.

Hazardous wastes should be homogenised prior to being fed into the bunker to demonstrate control on the wastes entering this facility and facilitating control of combustion. Alternatively waste should be sampled, analysed, segregated where appropriate and stored prior to feeding at a prescribed recipe. Homogenisation and storage should be carried out according to the relevant BREF following BAT.

All of the above requirements have a need for dedicated infrastructure which the applicant does not appear to have considered necessary in their application. VES would consider this to be a significant oversight and are of the opinion that permission to deliberately accept hazardous waste on-site should not be granted.

This is further highlighted by the document prepared by Okopol in 2009(Appendix 4). It states that: -

"The analysis of BAT reference documents on waste incineration and waste treatment revealed that the BAT techniques required for the incineration of hazardous wastes are not realised in many municipal waste incinerators. This is true especially regarding the BAT on waste acceptance procedures but also regarding storage of waste and appropriate treatment. The major deficit of municipal waste incinerators regarding the incineration of hazardous waste is seen in the missing capabilities for on-site analysis. Because the hazard potential of waste (especially from pre-mixing) does vary often, all BAT requirements related to improvement of knowledge about the composition of the waste are of h Thus it is seen as important that the further development of the R1-formula will not support the incineration of hazardous wastes in installations that have a lower environmental protection level than installations which are built for the incineration of hazardous wastes". [3]

6.0 Flue Gas Treatment Residues

The applicant has indicated that it will require to add the EWC codes 190107*, 190113* and 190112 to its licence to allow it to accept back flue gas treatment residues, bottom ash and boiler ash, temporarily before being re-sent for treatment. This implies that the applicant may already have issues with the disposal of the FGT residues or that the applicant is aware that there will be a significant increase in contaminant loading of these residues due to the level of contamination in the hazardous waste streams which may cause issues at the receiving outlets. If it is the former, the addition of hazardous waste streams containing contaminants such as heavy metals will change the composition of the bottom ashes, boiler ashes and flue gas treatment ashes. Additional contaminant loading of these residues will ultimately affect the outlet for these materials and whether or not the current disposal or recovery routes (in the case of IBA) can still be used.

In the event that the applicant is proposing to reintroduce the FGT to the incinerator it should be noted that these streams have a low CV with non-combustible fractions and therefore will aid to reduce the thermal load rather than add to it as is the objective stated by the applicant in accepting hazardous waste streams. Return of these materials to the incinerator will also lead to accumulation of contaminants in the process residues and potentially increased contaminants in the emissions as the flue gas treatment process is overloaded. As a result the reintroduction of FGT residues into the incinerator should not be allowed.

Considering that the applicant has issues relating to the incomplete combustion of the current non-hazardous waste streams – referenced in their Response to Further Information Request to ABP we must voice our extreme concerns relating to possible incomplete combustion of hazardous waste and how this unburnt hazardous material will be managed. Incomplete combustion is extremely unusual in a newly constructed / designed MSW incinerator and could imply that the incinerator cannot manage the current waste volume throughput not to mention enhanced waste volumes (some of which could be hazardous). In the event that hazardous waste has been incompletely combusted and drops into the ash heap, then all of the ash collected during that event will have to be treated as hazardous and disposed of appropriately.

Considering the variability in the chemical composition, physical properties and combustion characteristics of proposed waste streams the mass balance of the contaminants entering the facility will also be variable. It is for this reason, should the wastes be permitted, that the EWC code for the bottom ash should be a mirror entry 190111* and a more vigorous testing program be a condition.

7.0 Infrastructure

As mentioned earlier BREF requires that the proper infrastructure is in place for a facility to accept hazardous waste, and, for the acceptance of clinical waste. The applicant has not described the proposed nature of this infrastructure and indeed appears to imply that there will be no additional infrastructure required for the acceptance of hazardous waste other than additional laboratory equipment. Moreover the applicant has not attempted to describe the infrastructure that would be required under WI BREF for the proper management and incineration of clinical waste.

The changes proposed in infrastructure are summarised as follows:

- Future additional capacity ammonia storage tank and fuel oil tank (Based on the application it is likely that this will in the future be used for other intentions such as storage waste oil/solvent. It is not beyond the realms of possibility that this tank could also be used to store aqueous waste).
- Convert hardcore area for contractor parking during construction to permanent status
- Conversion from temporary to permanent status of two structures:
    - Spare parts warehouse & associated switchgear building with hard core surround.
    - Single storey modular office block & associated electrical switchgear building and to include:
        - Effluent treatment plant
        - Paved roadway (with hard cored area to each side) leading to office block
        - 22 additional paved car park spaces added to existing car-park.

Other than the fuel storage tank the applicant does not appear to have considered the delivery, acceptance and handling requirements of hazardous waste for the site. VESI has summarised below three possible scenarios where significant infrastructure is required which the applicant has not appeared to have considered. Based on the current application all three situations could arise individually or collectively. Each would require additional infrastructure which the applicant has not applied for from a planning viewpoint. This is a major over-site and as a result the applicant should not be granted permission to deliberately accept hazardous waste.

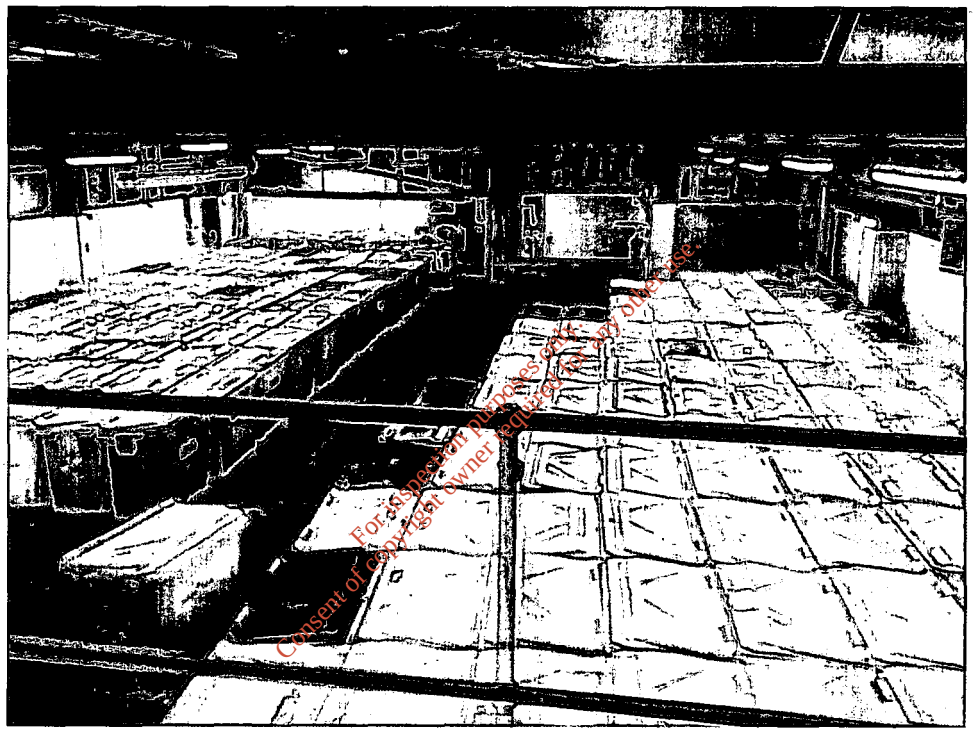
Case 1

Aqueous waste proposed to be accepted at the site may arrive in tankers, IBC's and/or barrels. It is proposed to inject directly this material onto the grate. If arriving in tankers it is expected that the tankers will be sampled and analysed before injected onto the grate (or added to a storage tank!). Has the applicant allowed for a bunded area to store this tanker? If arriving in IBC's/ barrels (in many situations on a 40ft trailer which may hold up to as a minimum 22IBC's or 88 200l barrels) these can

only be injected at best a few at a time. Best practice dictates that these must be representatively sampled prior to injection. Has the applicant allowed for a sufficiently large bunded temporary storage area for these pending analysis and subsequent injection onto the grate?

Case 2

At present no infrastructure is proposed for the management of clinical waste other than a direct feeding mechanism. There does not appear to be any thought given to the storage of bins pending incineration, empty bins post incineration and empty sterilised bins awaiting recollection (see below photo of bin storage for some bins in a clinical waste incinerator).



Photograph of Partial Bin Storage

Based on the experience of Veolia these do require significant space requirements. As this waste only arrives in bins there will a requirement for internal storage of full and empty bins. There will be a requirement for an area to accommodate the loading and unloading of these bins from vehicles using forklifts/ tail-lift devices as they cannot be directly tipped in the waste bunker upon arrival. There will be a requirement for a feeding mechanism to feed the clinical waste onto the grate directly. There will be a requirement for a quarantine area for any unacceptable clinical waste.

Furthermore, no thought appears to have been given to the sterilisation of bins post incineration of the contents as per BAT 5.6, 80 and the subsequent treatment of these washings. Nor has consideration been given for the storage of anatomical waste 180103*.

If the applicant is proposing to accept clinical waste there is a significant infrastructure requirement.

Difficulties exist with the incineration of clinical waste on moving grate incinerators due to the development of hot spots on the grate as a result of the high CV and combustion properties of the waste. The higher corrosivity of the flue gases from the combustion of this waste will also have an impact on the construction materials of this facility affecting availability, based on the experience of Veolia. This results in grate damage which can affect the overall performance and availability of the incinerator. In the event of the incinerator closing down unexpectedly there appears to be no contingency in place for the subsequent management of unprocessed waste.

It is contended that the application to accept clinical waste at the facility is premature given the significant lack of information and should not be permitted.

Case 3

The applicant proposes to accept solid hazardous waste. Unlike municipal waste this waste will not arrive in skips and/or ejector trailers. Common transport practices for solid hazardous waste(other than contaminated soils/ C& D waste) is by curtain-sided trailers and/ or 20ft/40ft container boxes. Unloading of these must be loading via a loading ramp and with fork-lifts. Again good practice dictates that these should be inspected and sampled representatively prior to incineration. A 40ft box can contain up to 44 pallets of various drums/ boxes and containers. There does not appear to be an area allocated to store this material pending approval for incineration. Furthermore, depending on the CV of the material the addition of it to the bunker may be staggered to ensure a more even feed to the grate.

Should all three scenarios manifest this would require a significant storage area .

These matters were also a concern of professor Broderick in his report to An Bord Pleanala (Appendix 7)

Carefully planned storage and management of waste prior to treatment is required to minimise pollution impacts, including odour releases. At the Carranstown facility, the waste delivery area is enclosed, and this helps avoid odour, noise and emission impacts. If the types of wastes received are diversified beyond the existing restriction to MSW only, then greater waste inspection requirements can be expected. This inspection will need to take place in the enclosed delivery area, and adequate provision will be needed for waste considered unsuitable for treatment following inspection. The Applicant has not provided detailed information on what arrangements will put in place in this regard, but it is unlikely that the current practice of unloading directly from delivery vehicles to the waste bunker will suffice for all the additional waste types received. Operational and safety challenges may

also arise due to the mixing of hazardous and non-hazardous wastes in the bunker, as all waste in the bunker will then potentially need to be managed and handled as hazardous waste.

8.0 Site Selection

The applicant states that the site was suitable for the proposed developments as Meath County Council and An Board Pleanala granted permission for a Waste to Energy facility at the location. The applicant did not state that when both parties made their decision they were not asked to consider the location as a suitable site for the location of a hazardous waste facility. Because a facility is suited for a non-hazardous waste municipal facility it does not automatically infer that the same location is suitable for hazardous waste. As the applicant does not appear to have carried out a proper scoping exercise relating to the sitting of the facility for hazardous waste it has to be considered if the EIS is valid.

9.0 Conclusions

Having reviewed the Environmental Impact Assessment and Waste Licence Application VESTS is of the opinion that the proposed amendments sought will require significant changes to the process, waste handling procedures and infrastructure. The applicant has not allowed for these in their application as they consider the opposite to be true. Furthermore, many of the hazardous waste types will not contribute to the CV of the waste accepted on-site and must be considered as disposal. As a result VESTS are of the opinion that the amendments sought should not be granted.

11. Appendices

1. **Danish Municipal Solid Waste Incinerators with R1 status. Danish Ministry of the Environment (Environmental Protection Agency). June 2011.**

2. **'Recovery' in European Waste Law and its Importance to the Operation of Waste Facilities. Legal Opinion at the Request of EURITS. Prof. Dr. Martin Beckmann. (Honorary Professor at the University of Münster). Münster, August 2012.**

3. **Letter from Sakab (and translation) to Authorities re-R and D codes and subsequent reply and translation.**

4. **Brief expertise on the application of the energy efficiency formula of Annex II of the Waste Framework Directive 2008/98/EC and potential adverse effects Final report, Juli 2009. Okopol.**

5. **Waste Acceptance criteria of AEB.**

6. **Waste Acceptance criteria of KWA.**

7. **Prof. Broderick Report to An Bord Pleanala.**

Appendix 1

Danish Ministry
of the Environment
Environmental
Protection Agency

Jord & Affald
J.nr.
Ref. thfru
June 29 2011

Danish municipal solid waste incinerators with R1 status

According to Annex II of the Waste Framework Directive Article 3, number 15 and Annex III, entry R1 and its footnote *, incineration facilities dedicated to the processing of municipal solid waste (MSW) can be classified as recovery operations (R1) only where their energy efficiency is equal to or above:

- 0.60 for installations in operation and permitted in accordance with application Community legislation before 1 January 2009
- 0.65 for installations permitted after 31 December 2008, using the following formula:

Energy efficiency = $(Ep - (Ef + Ei))/(0.97 \times (Ew + Ef))$, in which

Ep = annual energy produced as heat or electricity. Heat produced for commercial use is multiplied by 1.1 and electricity is multiplied by 2.6.

Ef = annual energy input to the system from fuels contribution to the production of steam

Ew = annual energy contained in the treated waste

Ei = annual energy imported excluding Ew and Ef

0,97 is a factor accounting for energy losses due to bottom ash and radiation.

The Danish Environmental Protection Agency confirms that the MSW incinerators listed in Annex A to this document can be classified as R1 plants according to the above formula-requirement. This classification only applies in so far as the plant incinerates non-hazardous waste. Incineration of hazardous waste, either in MSW incinerators or in plants dedicated to incineration of hazardous waste is still considered a D10 operation.

The annex will be updated and reviewed regularly or when considered justified, inter alia by new information.

The listing of a plant in Annex A to this document does not in any way effect the requirements under and application of Regulation 1013/2006 on shipments of waste with respect to the listed plants or waste destined for incineration at the listed plants.

Dorte Hermansen, Head of Division

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Appendix 2

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'Recovery' in European Waste Law and its Importance to the Operation of Waste Facilities

Legal Opinion

at the request of

EURITS

the European Union for Responsible Incineration and Treatment of Special Waste

by

Prof. Dr. Martin Beckmann

honorary professor at the University of Münster
specialist solicitor for administrative law

Münster, August 2012

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A. Introduction

EURITS – The European Union for Responsible Incineration and Treatment of Special Waste is an Europe-wide association of hazardous waste management companies. It represents most of the EU's companies active in the specialist waste incineration sector. Its goal is to ensure the safe, legal and environmentally sound incineration of waste. EURITS was established in 1994. The organization counts 26 members which operate in 12 different countries.

The signatory was asked to help EURITS with some legal advice on the interpretation of EU waste legislation. EURITS wishes to explore the possibility of a legal challenge to the European Commission's interpretation of certain key provisions of the third EU Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the Council of 19.11.2008 on waste and repealing certain Directives, OJ EC of 2008 No L 312, p 3, hereafter: WFD) particularly those relating to the classification of facilities as recovery and/or disposal. The European Commission has adopted a non-legally-binding guidance document on how Member States should interpret key provisions of the WFD in June 2012. One of the key provisions of the WFD is a distinction between various types of operations.

The Commission's guidelines (Directorate-General Environment, Guidance on the interpretation of key provisions of Directive 2008/98/EC on waste, June 2012; hereafter: guidelines) indicate that an operation can only have one single R or D code (see section 1.4.5, p 30 of guidelines) based on its primary purpose. EURITS has argued that an 'installation' is not equal to an 'operation' and that a single installation or treatment facility can perform multiple operations (this is recognised by many permitting authorities Europe-wide which issue permits for multiple R and D operations within the same facility). The type of operation will depend on a combination of the equipment and the properties of the waste.

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The guidelines use the terms 'operation', 'installation' and 'plant' interchangeably. One object of this legal opinion is to show that this use of terms is legally incorrect and, if actually demanded by the authorities, technically impossible.

EURITS asks the signatory if there is any legal recourse for EURITS to challenge the Commission's guidelines and interpretations on the following issues:

1. The failure to recognise that a single plant/installation can have multiple operations with different R and D status.

2. Jurisprudence developed under previous legislation can not or should not be used when new legislation has been developed and when definitions have been changed.

3. What are the practical implications for the classification of:

   a. Hazardous waste incinerators?

   b. Municipal waste incinerators?

   c. Pre-treatment facilities with the outputs being sent to different final treatment facilities with a mix of R and D codes?

B. Subject of this report

At first I will comment the legal significance of the guidelines. Starting point of this statement is the term 'recovery' as used in the european Waste Framework Directive. In this context the (corresponding) jurisdiction of the CJEU will be discussed. Following I will – in relation to different disposal operations – analyse if waste can be both recovered and disposed within one installation. Finally I will examine which practical implications for the classification as special waste incinerators/facilities follow the guidelines.

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C. Effects of the guidelines

The numeration of the legal acts of the Union in Article 288 TFEU is not conclusive. In addition to the legal acts listed in the TFEU, the EU can revert to further types of legal acts. Therefore the guidelines do not need to relate to the named types of action,

> cf *Frenz*, Handbuch Europarecht, Vol. 5, 2010, recital 1517 f with further references.

The guidelines are of importance for the administrative perfomance of both the Commission and the Member States. Although the Commission cannot make one-sided legal requirements, the guidelines provide help interpreting the Directive. Thus the guidelines belong to an individual category of sublegal frameworks,

> *Pampel*, EuZW 2005, 11 (12); *Thomas*, EuR 2009, 423 (423); *Frenz*, Handbuch Europarecht, Vol. 5, 2010, recital 1538.

However, the guidelines have to be in accordance with valid law. As a matter of principle, they cannot establish obligations,

> *Frenz*, Handbuch Europarecht, Vol. 5, 2010, recital 1542.

Accordingly, the Commission/DG Environment, too, assumes that the guidelines are not legally binding.

> DG Environment, guidelines, June 2012, p 3.

Insofar the guidelines are not binding for neither the courts nor the authorities of the Member States nor the producer and possessor of waste and the waste management companies. Since the authorities of the Member States can base their interpretation of the Directive and the following laws on the guidelines, they are of high importance for the practice.

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D. Legal analysis

After a short illustration of the term ‚recovery' and its interpretation by the jursidiction I will discuss if – and to what extent – recovery and disposal operations can be proceeded within one installation.

Beforehand it should be clarified that the distinction between recovery and disposal is only relevant as long as the material used in the operation is waste. If material is used as alternative fuel, it is not necessarily the case that this material is waste, with the consequence that the operation in question is no waste managemant at all and therefore neither a recovery nor a disposal operation,

Beckmann, AbfallR 2007, 267 (263, 269).

I. The term 'recovery'

The second WFD (Directive 2006/12/EC of the European Parliament and of the Council of 05.04.2006 on waste, OJ EC of 2006 No L 114, p 9) defined recovery as any of the operations provided for in Annex II B of the Directive (see Article 1 lit. f)). In Article 3 (15) of the WFD the EU firstly defines the term primarily abstract. Recovery is defined as any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the WFD sets out a non-exhaustive list of recovery operations (Article 3 (15) second sentence of the WFD). In Article 3 (16-18) of the WFD three recovery operations are defined, namely 'preparing for re-use', 'recycling' and 'regeneration of waste oils'. As counterpart 'disposal' is defined in Article 3 (19) first sentence of the WFD as any operation which is *not recovery* even where the operation has

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as a secondary consequence the reclamation of substances or energy. Similar to the definition of 'disposal', Annex I of the WFD sets out a non-exhaustive list of disposal operations (Article 3 (19) of the second sentence of the WFD). The interpretation of the WFD by the CJEU is legally binding.

(Since the legal definition of the term recovery was established in Article 3 (15) of the WFD, taking recourse to the definition of the CJEU, which was developed in absence of such an abstract definition, is not longer necessary.)

see i.e. CJEU, judgment of 27.02.2002 – Case C-6/00 (ASA), recital 69.

(The term „operation" is not defined legally.) According to general linguistic usage, it means a series of actions or steps towards achieving the recovery or disposal.

The legal definition does not use the terms 'plant' or 'facility'. The definition occurs detached from any kind of installation. Crucial for the classification as recovery is the main result of the operation. It is remarkable, that the european lawgiver does not refer to the main result or the main purpose of the installation. (None of the definitions focuses on plants or facilities.)

Neither the jurisdiction of the CJEU implies anything else – contrary to what the guidelines suggest on p 30. All the CJEU said was that an operation cannot be classified as recovery and disposal at the same time. From this, however, it does not follow that within one installation measures of both recovery and disposal cannot proceed, if the operations are not simultaneously or in different parts of the installation.

It already results from the listings of Annex II of the WFD that within one installation different operations of waste management may occur. The disposal operations D 13 and D 14 for example assume that the blending or mixing is followed by an operation D 1 to D 12 and that an operation D 1 to D 13 follows the repackaging. Consequently, several different measures – at least within one category of waste management – can be pro-

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ceeded inside one installation. Moreover, it is to consider that the recovery and disposal operations that are listed in Annex I and Annex II of the WFD are non-exhaustive. Further operations that combine these operations are imaginable. To such an extent also the guidelines assume the possiblity of combining different operations at least within the categories of waste management (see guidelines, p 32).

However, the problem is that the terminology of the guidelines and the 'Guidelines on the interpretation of the R1 energy efficiency formula for incineration facilities dedicated to the processing of municipal solid waste according to Annex II of Directive 2008/98/EC on waste',

> Directorate-General Environment, June 2011; hereafter: R1 guidelines,

is not coherent. Thus the R1 guidelines state on p 5 that the Directive allows municipal waste incinerators to be classified as recovery operations. Not the 'incinerators' themselves but the 'operations' within have to be classified in reference to Annex I or II of the WFD.

The same goes for the thesis that the 'procedures for classification of municipal waste incineration facilities' are either a 'recovery operation' or a 'disposal operation' (see p 6 of the R1-guidelines).

In this context, a further conclusion of the guidelines is imprecise. The CJEU only decided that a single operation may not be classified simultaneously as both a disposal and a recovery operation,

> CJEU, judgment of 27.02.2002 – Case C-6/00 (ASA), recital 63; of 27.02.2003 – Case C-307-311/00 (Oliehandel Koeweit), recital 95.

That does not mean that any waste treatment can only be either a recovery operation or a disposal operation, as the guidelines state on page 30. Every waste treatment can be a

recovery operation as well as a disposal operation – just not at the same time. There is no need to look for the main purpose of the plant. To classify the operations as recovery or disposal operations, one has to focus on those operations, not on the purpose of the plant, which can include several different operations,

cf *Beckmann*, AbfallR 2007, 267 (274).

While a single operation must be given a single classification in the light of the distinction between a recovery operation and a disposal operation for the purposes of th application of the WFD, a waste treatment process can in practice include several successive stages of recovery or disposal. The treatment process as a whole is not to be assessed as a single operation. Each phase must be classified separately for the purpose of implementing the Regulation when it constitutes a distinct operation in itself,

CJEU, judgment of 03.04.2003 – Case C-161/01 (SITA), recital 41 f.

The Report on Definition of waste recovery and disposal operations, commissioned by the European Commission,

> Ökopol, Definition of waste recovery and disposal operations Part A - Recovery and disposal operations, Report compiled for the Directorate General Environment, Nuclear Safety and Civil Protection of the Commission of the European Communities, March 2004, hereafter: report.

states that waste management operations may have both a disposal component and a recovery component (see report, p 2).

The CJEU emphasized that an operation classified as waste recovery may be followed by a disposal operation of the non-recoverable fraction of that waste. In such a case, the classification of the first operation as a recovery operation is not affected by the fact that it is followed by an operation to dispose of the residual waste,

CJEU, judgment of 03.04.2003 – Case C-161/01 (SITA), recital 43.

The failure of the guidelines is due to the fact that they determine exclusion where the WFD and the judgments of the CJEU leave room for a more distinguished approach to the classification of waste treatment.

The WFD distinguishes between 'operations' on the one hand and 'installations', 'facilities', 'plants' and 'establishments' on the other hand. As opposed to the guidelines, the WFD at no time uses those two categories of terms equally or interchangeably in their meaning. There is no indication whatsoever that the concept of the WFD is based on a facility-centred interpretation of the term 'operation'. The definition in Article 3 (15) of the WFD does not focus on 'installations', 'facilities', 'plants' or 'establishments' at all. In contrast, the definition clearly adresses the 'operation [...] *in the* plant or in the wider economy',

see *Kropp*, AbfallR 2010, 193 (197) as well.

The european lawmaker, namely the Commission of the European Communities, thought of facilities as places where several waste treatment operations of different classifications wouldproceed. In Article 22 lit. b) of the Proposal for a Directive of the European Parliament and the Council on waste,

21.12.2005, COM(2005) 667 final,

it says: 'Where an establishment or undertaking carries out both disposal and recovery, it may be exempted only in respect of its recovery operations.' Even if the exemption should not make the distinction in final there can be waste treatment operations from different categories.

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II. Multiple different operations within a single plant/installation

The question whether waste can be recovered as well as disposed in the same installation is to answer with regard to the particular kind of recovery. The distinction between recovery and disposal operation according to the installation is not appropriate. On closer examination, this also results from the administrative and legal practice, which is not opposed to the latest definition of recovery in the WFD.

1. Pre-processing

Installations for the pre-processing of waste can serve different functions. Pre-processing means inter alia dismantling, sorting, crushing, compacting, pelletising, drying, shredding, conditioning, repackaging, separating, blending or mixing prior to submission to any of the operations numbered D1 to D12 resp. R1 to R11 (see Footnote ** to Annex I resp. footnote **** to Annex II of the WFD.

> *Peine*, AbfallR 2008, 20 (27), claims that the use of footnotes would contradict the european principle of certainty).

Whether this is a recovery operation or disposal operation cannot be determined before the final outcome is set. Only with regard to the result of the treatment operation of the respective waste one can say if the waste will be recovered or disposed,

> see *Kropp*, AbfallR 2010, 193 (198).

The pre-processing itself can be recovery as well as disposal. This already results from the almost identical footnote ** to Annex I resp. footnote **** to Annex II of the WFD.

Indeed this means that a waste treatment operation cannot be related to both categories at the same time. But then no classification at all has to be done before the further pro-

cedure has been decided. After defining the procedure, the waste treatment operation can be related to either one of the categories.

Therefore an istallation for pre-processing that for example specialised in the sorting, cleaning and crushing of waste can carry out recovery operations as well as disposal operations. Only in the further procedure of the waste management one can and has to see whether the respective operation is recovery or disposal.

2. Energy recovery

In its decicion concernig the waste incinerator Strasbourg the CJEU explained that if the waste is used principally as a fuel or other means of generating energy, the greater part of the waste must be consumed during the operation and the greater part of the energy generated must be reclaimed and used,

> CJEU, judgment of 13.02.2003 – Case C-458/00 (COM/Luxembourg – WIP Strasbourg), recital 34.

However, where the reclamation of the heat generated by the combustion constitutes only a secondary effect of an operation whose principal objective is the disposal of waste, it cannot affect the classification of that operation as a disposal operation,

> CJEU, judgment of 13.02.2003 – Case C-458/00 (COM/Luxembourg – WIP Strasbourg), recital 43.

Based on this jurisdiction, the european lawgiver set the preconditions that are necessary for the incineration of waste (in a waste incinerator) in order to be classified as recovery operation in Annex II footnote * of the WFD,

> *Stengler*, AbfallR 2011, 213 (213 f).

The european lawgiver basically adopted the non-exhaustive listing of recovery operations from Annex II A of the second WFD into Annex II of the (current) WFD. The description of R1 stayed untouched. Accordingly an operation is classified as recovery if the waste is used ‚principally as a fuel or other means to generate energy'. This provision is complemented by a footnote. Thereby the european lawgiver determines that this classifictaion includes incineration facilities dedicated to the processing of municipal solid waste only where their energy efficiency is equal to or above one specific parameter.

According to its wording, this formula is valid only for incinerators. In addition, its applicability is limited to solid municipal waste. Only if the purpose of a incinerator is the treatment of this waste one can apply the R1 formula.

This was accounted for by the R1 guidelines. On p 6 it says that the 'R1 formula' is a performance indicator for the level of recovery of energy from waste in a plant dedicated to the incineration of municipal solid waste (MSWI). Annex II, footnote * of the WFD would clearly restrict the scope of the formula to MSWI. (If the installation in question is no incinerator or if the incinerated waste is no municipal solid waste, the R1 formula is not applicable.) From this it follows that the R1 formula is not valid for installations that do not firstly serve the incineration but lead to co-incineration in production processes. (The R1 guidelines state that the R1 formula does not apply to co-incineration plants and facilities dedicated to the incineration of hazardous waste as well as to the incineration of hospital waste, sewage sludge or industrial waste.)

see p 6 of the R1 guidelines; *Kropp*, AbfallR 2011, 207 (211 f).

Beyond that, the significance of the R1 formula is limited. The german wording of the footnote, which is as equally binding for the interpretation as the english wording, does not definetly tell if the energy efficiency has to be related to the particular waste or to the installation itself. The english and french version of the Directive however argue for

an inaccuracy of the german version. The installation has to be in accordance with the energy efficiency, no matter what kind of waste is incinerated. Although the formula does not say that an operation is recovery already if the heating value is reached. Crucial is, according to the legal definition of Article 3 (15) of the WFD, the main result. In this respect the jurisdiction of the CJEU is right in saying that the main part of waste has to be recovered in order to label this process as recovery operation. The R1 formula limits the applicability of this definition concerning municipal solid waste incinerators to such an extent as the installation then has to reach a certain heating value in order to rate any operation as recovery operation,

> *Kropp*, AbfallR 2010, 193 (197) is right in saying that the footnote in Annex II is systematically wrong placed.

From the R1 guidelines it can clearly be seen that the Commission as well assumes that different operations of waste management can be proceeded in a single facility even if this facility is generally dedicated to operations of R1. In case an incineration plant has two seperate lines, i.e. one line for hazardous waste and the other for MSW, only the line for MSW will be taken into account for the calculation of the R1 formula. That means that at least two different R1 operations are running within one plant, or one R1 operation and another waste treatment operation for hazardous waste,

> R1 guidelines, p 7.

That shows that the R1 status can be granted to the plant, but it would not be valid for every waste that is treated there,

> for details see *Kropp*, AbfallR 2010, 193 (197 f); *Kropp,* AbfallR 2011, 207 (211 f); of other opinion *Stengler*, AbfallR 2001, 213 (215 f).

For the co-incineration in production processes and special waste incinerators however there is no restriction pursuant to footnote * to Annex I of the WFD. These operations

of waste treatment can be classified as recovery operations in accordance with R1 of Annex II of the WFD even if the waste is used principally as a fuel or other means to generate energy but without fulfilling certain criteria of the R1 formula. To that extent, the general criteria of the legal definition of Article 3 (15) of the WFD and the jurisdiction of the CJEU prevail.

> see *Petersen*, AbfallR 2008, 154 (158, footnote 40); *Buch*, AbfallR 2009, 74.

In the judgment concerning the Belgium cement industry, the CJEU held the view that an operation, where the concerned waste is intended for use as a fuel in order to replace sources of primary energy in heating cement kilns, constitutes a recovery operation.

> CJEU, judgment of 13.02.2003 – Case C-228/00 (COM/Germany – Belgian cement industry), recital 53.

Not only the classification to one of the R operations is vital. Moreover it is necessary that in a given case the confirmation of that classification shows that the principal objective of the operation in question is that the waste serves a useful purpose in replacing other materials that otherwise would have been used for that purpose (Aerticle 3 (15) of the WFD),

> see also CJEU, judgment of 27.02.2003 – Case C-307-311/00 (Oliehandel Koeweit), recital 86.

Given this legal definition, the incineration of material in a special waste incinerator can absolutely constitute an operation of recovery. Thus the highest German administrative court, the Bundesverwaltungsgericht, decided that the purpuseful usage of certain liquid wastes with a high calorific value as substitute for fuel within a waste incinerator facility can be classified as energy recovery. The condition precedent is that the incineration is aimed at preventing the operating temperature from dropping. It is vital that the pur-

pose of incineration of the material is not the disposal of that material, which would be the exclusion from the economic cycle, but the substitution of primary energy in order to make the disposal operation possible. A recovery operation can therefore also proceed in a facility that is otherwise dedicated to disposal operations,

> see BVerwG, judgment of 26.04.2007 – 7 C 7/06, NvWZ 2007, 1083 (1084).

3. Material recovery

Even the recycling of waste in the framework of disposal schemes is possible. Thus waste with certain physical characters can be mixed with waste for disposal in order to make the waste for disposal pumpable. As a result it is unnecessary to add liquids, namely tap water or drinking water. After adding the waste, some kind of slurry results, which leads to a change of the waste by physical and chemical interactions between the wastes. Thus it is possible to transport the former solid waste for disposal using a vacuum tanker and involve it in incineration processes by means of pumping stations. Similar to the above mentioned energy recovery, the use of the waste is aimed at substituting a different substance – in this case not only its energetic value.

4. Conclusion

The preceding examples illustrate that a classification of operations corresponding to the actual funtion of the plant or the principally treated wastes is not appropriate. In order to decide whether a treatment is a recovery or disposal operation, one has to consider each waste seperatly and moreover take into account the function of the waste in a

certain plant. Nothing else did the european lawgiver mean by stating ‚operation' in Article 3 (15) of the WFD.

In our opinion, there is no possibility to bring the guidelines before the CJEU by a private person. Article 263 (4) TFEU states that any natural or legal person may, under the conditions laid down in the first and second paragraphs, institute proceedings against an act addressed to that person or which is of direct and individual concern to them, and against a regulatory act which is of direct concern to them and does not entail implementing measures. The guidelines are neither addressed to EURITS nor are they of direct and individual concern to you. Since they are not legally binding and it is up to the Member States whether or not they follow these guidelines. However, in our opinion there is no need to challenge the guidelines at all, since the important provision on recovery operations (1.4.5., p 30 ff) does not explicitly contradict our opinion. Rather, both guidelines state conclusions that might be misunderstood by the authorities of the Member States.

III. Practical implications for the classification of incinerators/facilities

Concerning the classification of incinerators and facilities it results that the relation to a such status does not already state that generally exclusively these kind of operations occur.

Regardless of the type of plant (harzadous waste incinerators, municipal waste incinerators etc), all kinds of waste treatment operations may be proceeded in all plants. The only decicive factor is always the funtion of the waste in the particular case.

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E. Summary

- The WFD distinguishes between recovery operations and disposal operations. There is no indication and no need for the application of the WFD, that one plant cannot fulfill both forms of operations, as long as every operation can be labeled – even in retrospect – as one of the waste treatment operation categories.

- The jurisdiction of the CJEU does not contradict this distinction.

- Plants, in which waste is usually disposed, can as well serve particular recovery operations and conversely may plants which are dedicated to recovery operations, plants which co-incinerate in production processes etc carry out waste disposal operations.

- As far as the guidelines, which are not unambigous in that point (see p 30 of the guidelines), contradict this legal opinion, would that view not be in terms with the valid european waste law.

- Since the guidelines do not have any direct legal effect and the application of the Directives is a matter of the Member States, any administrative processes that possibly diverge from the former stated results have to be appealed before the courts of the Member States.

Münster, 28. August 2012

Prof. Dr. Beckmann
solicitor

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List of abbreviations

AbfallR	Zeitschrift für das Recht der Abfallwirtschaft
BVerwG	Bundesverwaltungsgericht
CJEU	Court of Justice of the European Union
EuR	Europarecht
EuZW	Europäische Zeitschrift für Wirtschaftsrecht
guidelines	Directorate-General Environment, Guidance on the interpretation of key provisions of Directive 2008/98/EC on waste, June 2012
NVwZ	Neue Zeitschrift für Verwaltungsrecht
R1 guidelines	Directorate-General Environment, Guidelines on the interpretation of the R1 energy efficiency formula for incineration facilities dedicated to the processing of municipal solid waste according to Annex II of Directive 2008/98/EC on waste, June 2011
report	Ökopol, Definition of waste recovery and disposal operations Part A - Re-covery and disposal operations, Report compiled for the Directorate General Environment, Nuclear Safety and Civil Protection of the Commission of the European Communities, March 2004
second WFD	Directive 2006/12/EC of the European Parliament and of the Council of 05.04.2006 on waste, OJ EC of 2006 No L 114, p 9
TFEU	Treaty on the Functioning of the European Union
WFD	Directive 2008/98/EC of the European Parliament and of the Council of 19.11.2008 on waste and repealing certain Directives, OJ EC of 2008 No L 312, p 3

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Appendix 3

Danish Ministry
of the Environment
Environmental
Protection Agency

Jord & Affald
J.nr.
Ref. thfru
June 29 2011

Danish municipal solid waste incinerators with R1 status

According to Annex II of the Waste Framework Directive Article 3, number 15 and Annex III, entry R1 and its footnote *, incineration facilities dedicated to the processing of municipal solid waste (MSW) can be classified as recovery operations (R1) only where their energy efficiency is equal to or above:

- 0.60 for installations in operation and permitted in accordance with application Community legislation before 1 January 2009
- 0.65 for installations permitted after 31 December 2008, using the following formula:

Energy efficiency = (Ep – (Ef + Ei))/(0.97 x (Ew + Ef)), in which

Ep = annual energy produced as heat or electricity. Heat produced for commercial use is multiplied by 1.1 and electricity is multiplied by 2.6.

Ef = annual energy input to the system from fuels contribution to the production of steam

Ew = annual energy contained in the treated waste

Ei = annual energy imported excluding Ew and Ef

0,97 is a factor accounting for energy losses due to bottom ash and radiation.

The Danish Environmental Protection Agency confirms that the MSW incinerators listed in Annex A to this document can be classified as R1 plants according to the above formula-requirement. This classification only applies in so far as the plant incinerates non-hazardous waste. Incineration of hazardous waste, either in MSW incinerators or in plants dedicated to incineration of hazardous waste is still considered a D10 operation.

The annex will be updated and reviewed regularly or when considered justified, inter alia by new information.

The listing of a plant in Annex A to this document does not in any way effect the requirements under and application of Regulation 1013/2006 on shipments of waste with respect to the listed plants or waste destined for incineration at the listed plants.

Dorte Hermansen, Head of Division

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Annex A Danish MSW incinerators with R1 status. Plants not listed in this annex may still be classified as R1 plants, as for the time being only members of *waste denmark (*an association of stakeholders in the waste treatment sector in Denmark) are included in the list.

Name	Location
Amagerforbrænding	Kraftværksvej 31, 2300 København S
Haderslev kraftvarmeværk	Dybkær 2, 6100 Haderslev
Horsens kraftvarmeværk	Endelavevej 7, 8700 Horsens
Kraftvarmeanlæg Århus Nord	Ølstedvej 20, 8200 Århus
Måbjergværket	Energivej 2, 7500 Holstebro
Odense Kraftvarmeværk	Havnegade 120, 5000 Odense C
Reno-Nord	Troensevej 2, 9220 Aalborg Ø
Vestforbrænding	Ejby Mosevej 219, 2600 Glostrup

Appendix 4

Brief expertise on the application of the energy efficiency formula of Annex II of the Waste Framework Directive 2008/98/EC and potential adverse effects

Final report

Juli 2009

Ökopol GmbH, Hamburg

Content

1 Background

The revised Waste Framework Directive (Directive 2008/98/EC of the European Parliament and Council of 19. November 2008 on Waste and repealing of certain Directives) lists in Annex II operation on the recovery of waste. Entry R 1 characterises operations where wastes are used principally as a fuel or other means to generate energy. A footnote specifies that this includes incineration facilities dedicated to the processing of municipal solid waste only where their energy efficiency is equal to or above a certain energy efficiency value, which is:

- 0.60 for installations in operation and permitted in accordance with applicable Community legislation before 1 January 2009,
- 0.65 for installations permitted after 31 December 2008.

At the same time the footnote determines the formula for the calculation of the energy efficiency of such an installation:

$$\frac{(E_p - (E_f + E_i))}{(0{,}97 * (E_w + E_f))}$$

E_p annual energy produced as heat or electricity. It is calculated with energy in the form of electricity being multiplied by 2,6 and heat produced for commercial use multiplied by 1,1 (GJ/year),
E_f annual energy input to the system from fuels contributing to the production of steam (GJ/year),
E_w annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/year),
E_i annual energy imported excluding E_w and E_f (GJ/year),
0.97 factor accounting for energy losses due to bottom ash and radiation.

The formula is understood as basic approach for the calculation of energy efficiency and further details are to be elaborated. Recital 47 of Directive 2008/98/EC states that the European Commission should be empowered to adapt the annexes to technical and scientific progress and to specify the application of the formula for incineration facilities referred to in Annex II, R1.

Article 38 of Directive 2008/98/EC determines under the title "Interpretation and adaptation to technical progress" that the European Commission may develop guidelines for the interpretation of the definitions of recovery and disposal. "If necessary, the application of the formula for incineration facilities referred to in Annex II, R1, shall be specified. Local climatic conditions may be taken into account, such as the severity of the cold and the need for heating insofar as they influence the amounts of energy that can technically be used or produced in the form of electricity, heating, cooling or processing steam. Local conditions of the outermost regions as recognised in the fourth subparagraph of Article 299(2) of the Treaty and of the territories mentioned in Article 25 of the 1985 Act of Accession may also be taken into account." [Article 38(1)ii of Directive 2008/98/EC].

Article 4(1) of Directive 2008/98/EC defines the 5-step waste hierarchy, which builds a basis for a number of legislative pieces and political activities in the field of waste management. According to the "hierarchy" waste prevention has first priority, followed by the preparation for re-use, waste recycling[1] and other recovery (like e.g. energy recovery). Final disposal is the option with the lowest priority.

Article 4(2) of Directive 2008/98/EC states that Member States, when applying the waste hierarchy, shall take measures to encourage the options that deliver the best overall environmental outcome and highlights that this "may require specific waste streams departing from the hierarchy where this is justified by life-cycle thinking on the overall impacts of the generation and management of such waste".

The discussion about the energy efficiency formula as well as the analysis done so far show that some ambiguity regarding the practical application of the formula exist and that the formula in their present form without further specification could lead to adverse effects.

Additionally, waste management practice in Germany reveals a potential conflict between the application of the waste hierarchy and the actual disposal paths for hazardous wastes.

This brief expertise summarises problems related to the practical application of the energy efficiency formula and analyses the issue of treatment of hazardous substances in dedicated municipal solid waste incinerators.

2 Status quo

In an analysis of the year 2006 the energy efficiency of 64 dedicated municipal waste incinerators (MSWI) has been evaluated.

The majority of installations (44) deliver excess energy in form of electricity and heat to third parties. Nine MSWI deliver exclusively electricity and nine other installations deliver their HD-steam completely to third parties (mostly power plants or combined heat and power plants). Two installations supply heat into district heating networks. The threshold value for R1-operations according to the Waste Framework Directive of 0.6 for existing plants is achieved by applying a simplified formula[2] by 38 plants.

[1] Article 3 of Directive 2008/98/EC defines „Recycling" as follows: "any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;

[2] The simplified calculation has been done according to the following formula:

$$Eff = \frac{[Produced\ Electricity\ (to\ third\ parties + own\ consumption)]x2.6 + [used\ thermal\ energy]x1,1}{[Energy\ content\ in\ fuel]}$$

Imported energy from fossil fuels has not been considered. In order to ensure non-discrimination of installations which do not produce electricity consumption of external energy input is not considered in those cases.

3 Putting the energy efficiency formula in concrete terms

A number of open questions with the application of the energy efficiency formula is related to the temporally and the physical reference framework.

Annex II of the Waste Framework Directive states as temporally framework for the determination of the R1-value the term "per year":

- *„E_p annual energy produced as heat or electricity…,*
- *E_f annual energy input to the system from fuels contributing to the production of steam…,*
- *E_w annual energy contained in the treated waste…,*
- *E_i annual energy imported…"*

[Footnote* to operation R1 of Annex II of the Waste Framework Directive].

The physical reference framework as stated directly in Annex II is the installation:

*„ *This includes incineration facilities dedicated to the processing of municipal solid waste only where their energy efficiency is equal to or above…"*
[Footnote* to operation R1 of Annex II of the Waste Framework Directive].

Recital 20 of the Waste Framework Directive states municipal solid waste as reference framework:

„This Directive should also clarify when the incineration of municipal solid waste is energy-efficient and may be considered a recovery operation".

Chapter IV "Permits and Registrations" requires in Article 23 "Issue of permits":

„It shall be a condition of any permit covering incineration or co-incineration with energy recovery that the recovery of energy take place with a high level of energy efficiency.".

3.1 Basic issues

The R1-formula does not hold up against a scientific evaluation of their appropriateness for the determination of energy efficiency, as the German VDI concludes in a comment dated 15.11.2006[3]: "The proposal for the determination of the energy efficiency in the draft Waste Framework Directive does not comply with a state of the art which is based on scientific knowledge and practical experiences. Thus it does not fulfil the requirements of the vdi standard for a scientifically sound and technically correct approach as required for vdi-code" [vdi 2006] (see also Annex 1 of this report).

A major point of criticism is the requirement that electricity and steam that is used in the installation itself is not considered in the calculation of the energy efficiency of the installation. This leads to the effect that efficient off gas abatement systems are not advantageous compared to non-efficient systems. While effective abatement systems are appreciated from an environmental point of view the energy efficiency formula does not reward improvement of internal energy efficiency. An alignment with the requirements of "best available technique" and the related emission values are stated as sensible prerequisite for a status of a recovery plant. In case this requirement is fulfilled, it would be advantageous to include internal energy efficiency in the calculation.

An additional point of criticism regards the political determination of the factor 2.6 for generation of electricity. This factor corresponds according to [vdi 2006] to the production of electricity without utilisation of heat (38 %). This is contrasted with an optimised production of electricity which could achieve energy efficiency values above 100 % according to the formula. An installation which provides steam for external utilisation is discriminated by the low factor of 1.1 for steam production, even when external electricity production can be much more efficient.

[3] Bewertung der Energieeffizienz in Anlagen zur thermischen Abfallbehandlung Stellungnahme des Ausschusses VDI 3460 der Kommission Reinhaltung der Luft im VDI und DIN – Normenausschuss KRdL - 15.11.2006

3.2 Basis for the calculation

Dedicated municipal waste incinerators accept a broad variety of wastes from private households and enterprises in addition to municipal solid waste. This includes wastes with a low calorific value like:

- Sewage sludge from municipal and industrial waste water treatment,
- Sludges from washing, cleaning, centrifugation and separation processes,
- Calcium carbonate sludge,
- Clay,
- Filter cakes and absorption materials,
- Sludges from sinks, sand catcher,
- Polluted soils.

I many cases the calorific value for those wastes is below the value which is required for self sustaining combustion or which would be sufficient to achieve an R1-status in a mono-combustion plant for such waste[4].

It is an open question whether the R1-status shall apply for all waste that is used in an installation, which has an R1-status. Article 3 "Definitions" of the Waste Framework Directive says:

"...any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy."

In addition to fulfilling the requirements of the energy efficiency formula, which is oriented at the installation, Article 3 requires each waste to provide to the substitution of other materials or energy sources.

Summarizing it can be stated that it seems to be necessary to determine a minimum calorific value of each waste which shall be recognised as recovered in a R1-installation.

Additionally it is questionable whether recital 20[5] of the revised Waste Framework Directive also covers the combustion of hazardous waste. This leads to the question how installations are to be assessed which combust wastes other than municipal waste (section 20 of the European List of Waste) like wastes from section 19 and 16 of the European List of Waste, wastes from production processes or hazardous wastes and whether a minimum share of municipal solid waste has to be considered.

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[4] It is assumed here that installations for the incineration of municipal solid waste need a certain supply with energy in order to be run. Waste with a calorific value close to the value that is needed for self sustaining combustion are not able to cover that energy need and to achieve an R1-status at the same time.

[5] „(20) This Directive should also clarify when the incineration of municipal solid waste is energy-efficient and may be considered a recovery operation."

3.3 System boundaries

System boundaries for the calculation of energy efficiency are set in a narrow way by taking the incineration plant as reference framework.

The BAT document on waste incineration plants states for example that pre-treatment of waste before incineration might have significant influence on the overall energy efficiency of waste treatment. (e. g. *„If the incoming waste requires significant pre-treatment (e.g. crushing, shredding, drying etc.) this can result in very significant additional energy requirements".* [BREF WI, 2006, S. 193])

It is questionable whether the narrow system boundaries of the energy efficiency formula fulfil the requirements of the Waste Framework Directive. With such narrow system boundaries it would be possible, for example, that thermal drying of waste (e.g. sewage sludge) before the combustion in a MSWI is not considered in the calculation of energy efficiency and the incineration of the sewage sludge would get the status of recovery in a R1-process.

3.4 Time reference

Time reference of the footnote of Annex II of the Waste Framework Directive is „per year". Even if an installation has technical equipment and is linked to energy utilisation that would be capable to fulfil the R1-status, a number of factors will influence the achievement of the required energy efficiency in a period of 12 months. This can be the case e.g.

- when an external consumer of the thermal energy reduces the consumption e.g. because of declining economic activity, weather conditions or because of maintenance work or when a consumer of energy ceases to exist,
- technical problems with the installations for the generation of electricity or the export of heat occurred,
- frequent starts and shut downs of the plant has been necessary and by this the consumption of primary energy source increased,
- very wet waste has been incinerated after a bunker fire has been extinguished and additional primary energy sources have been consumed,
- because of fluctuating calorific values of the waste input.

An ex ante assessment of the technical capability of the installation e.g. in the context of permitting an installation seems to be sensible anyhow (e.g. to give the plant operator a basis for contracts with waste producers). But it will be necessary in any case, to develop procedures and rules for the ongoing evaluation and monitoring of the status and the performance of the installation in real life. This is crucial not least to avoid situations where for the single assessment the installation is run in a way that the requirements of the R1-status are fulfilled and after the assessment the installation is run again in a different way.

The Waste Framework Directive does not provide sufficient evidence for setting a sensible time reference framework.

Vice versa it is an open question how and in which time frame the R1-status might be withdrawn for an installation.

- In case that the installation did not fulfil the energy efficiency requirements retrospectively, it is unclear from which time the delivery of wastes, which are dedicated for recovery, must be stopped (taking into account e.g. existing contracts for acceptance of wastes for recovery).
- In case the R1-status has been withdrawn retrospectively, does this mean that the wastes incinerated in the respective time period can not be counted as recovered (and if so with which consequences)?
- After which period is it possible for the installation to get the R1-status back?

It becomes obvious that even when a shifting 12 month period is set as time reference framework it will be necessary to further elaborate on details of withdrawing the R1-status.

3.5 Monitoring

Depending on how the R1-status of an installation is determined (see above) different requirements evolve regarding the energy efficiency calculation and the monitoring approach. When temporary operation conditions shall be considered, monitoring will be different compared to approaches where those temporary conditions do not play a role. The variety of approaches reaches from single certification of an installation (e.g. in case that the principal technical capability of the installation shall be approved) to recurring proof of energy efficiency (e.g. via the operations diary and the proof of exceptional conditions).

Harmonised monitoring requirements are also seen as crucial in order to achieve uniform assessment of installations all over Europe. Otherwise differences in the R1-monitoring can lead to distortion of competition especially in areas close to borders and to problems regarding the planning reliability in municipal waste management.

3.6 BAT-reference

Footnote "*" the entry R1 of Annex II of the Waste Framework Directive requires:

"This formula shall be applied in accordance with the reference document on Best Available Techniques for waste incineration."

It is seen as necessary that all relevant requirements of the BREF-document are to be considered. Uncertainty exists regarding the potential consequences of this requirement concerning the R1-status of MSWI. This has to be clarified in

the course of the further development of the implementation of the R1-formula (see also section 4 of this document).

4 Effects on steering of waste with accelerated risk potential

The definition of recovery and final disposal installations and the differentiation by operations according to Annex II of the Waste Framework Directive are applied as basis for a variety of purposes like e.g. the determination of recovery rates, influence the transboundary shipment of wastes. They are also applied to check whether the rules of common market are to be applied on the shipment of the waste[6].

The "Thematic Strategy on the prevention and recycling of waste" (TSPR) expects that precise definitions will facilitate the functioning of an internal market for recycling applying high environmental standards [TSPR p.15]. The energy efficiency formula introduced in the Waste Framework Directive focuses the decision on recovery or final disposal in cases of MSWI on the criterion of energy efficiency. Background of the decision to take this approach was, inter alia, that "municipal incinerators with high energy efficiency are negatively discriminated against compared with co-incineration operations with similar energy efficiencies but less stringent emission controls" [TSPR p. 14].

Potential adverse effects of the characterisation of an operation exclusively based on the criterion "energy efficiency" have been rarely considered in the context of Annex II of the Waste Framework Directive and the text of the TSPR. The current implementation of the energy efficiency criterion and the missing clarification of a number of issues (see chapter 3 of this document) could result in an additional impulse that steers waste with high risk potential into municipal waste incinerators that have the R1 recovery status instead of being incinerated in hazardous waste incinerators that achieve better environmental performance for that kind of waste.

The following section describes definitions of "Best Available Techniques" (BAT) for the incineration of waste and evaluates them in the context of the objective of this study.

[6] [COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THHE COMMITTEE OF THE REGIONS Taking sustainable use of resources forward: A Thematic Strategy on the prevention and recycling of waste, COM(2005) 666 final, p. 15]

4.1 Best Available Technique according to the BREF document on waste incineration

The Best Available Technique Reference Document (BREF) document defines generic and specific BAT in chapter 5. Generic BAT apply for all kind of waste incineration plants, the specific BAT apply only for the incineration of hazardous waste.

The analysis on the following pages shows that many MSW incinerators do not fulfil relevant elements of what is defined as BAT for the incineration of hazardous waste.

No.	BAT according to BREF document on Waste Incineration (2006)	Realised in MSWI
1	**Selection of an installation design that is suited to the characteristics of the waste received, (ch. 5, p. 435)?:** 4.1.1. Appropriateness of process design for waste input ☐ the design of the combustion must be adapted (4.1.1); to the objectives of destruction of organic substances, energy production and meeting of emission requirements; Factors that must be considered (4.1.1): ☐ Variability and composition of waste, ☐ physical parameters (size, etc.), ☐ thermal characteristics, ☐ operational capacity and process availability, ☐ quality of bottom ash and other output, ☐ possibility for utilisation of output like gas or coke from pyrolysis, ☐ emission limit values and off gas abatement techniques, ☐ energy production (electricity, heat, combined heat and power). In addition to these technical criteria, the following may also influence the final design choice: ☐ degree of technical risk, ☐ operational experience and available skill, ☐ budget.	Partly
	4.2.1. Selection of combustion technology See tables (4.7, 4.6, 4.9) comparing combustion technologies, waste characteristics, throughput and other factors in BREF p.236ff	Partly
	4.2.3 Combustion chamber design features See table 4.10 in BREF on p 242	Partly
2	**Are general housekeeping measures taken?** 4.1.2 General housekeeping measures ☐ the use of systems to identify and locate/store wastes received according to their risks ☐ the prevention of dust emissions from operating equipment ☐ effective waste water management, and ☐ effective preventive maintenance.	seldom
3	**Are maintenance and pre-emptive maintenace routines ensured?**	Yes

No.	BAT according to BREF document on Waste Incineration (2006)	Realised in MSWI
4	**Are acceptance controls and quality assurance measures fort he waste input in place and adapted to characteristics of waste input?** 4.1.3.1 Establishing installation input limitations and identifying key risks □ specification of appropriate input depends on design of installation Influencing factors are: □ design of waste feed mechanism and the physical suitability of waste received, □ waste flow rate and heat throughput rating of the furnace, □ emission limit values required to be reached (i.e. % pollutant reduction required), □ flue-gas cleaning technology capacity for individual pollutant removal (e.g. limit on flue-gas flow rate, pollutant loading, etc.). Key risks can be: □ high mercury input, leading to high raw flue-gas concentrations, □ high iodine or bromine input, leading to high raw flue-gas concentrations, □ high variability in moisture content or CV, leading to combustion irregularities, □ high chlorine loading exceeding FGT capacity, □ high sulphur loading exceeding FGT capacity, □ rapid change in flue-gas chemistry that effects FGT function, □ physically large items blocking feed systems - leading to an interruption of regular operation, □ excessive slagging/fouling of boiler components when certain types of waste are being fed e.g. high Zn concentration sources (contaminated wood waste) have been reported to cause abnormal slagging in the first boiler pass. Developing a targeted control strategy to reduce these risks.	**partly**

No.	BAT according to BREF document on Waste Incineration (2006)	Realised in MSWI
	4.1.3.2 Communication with waste suppliers to improve incoming waste quality control 4.1.3.3 Controlling waste feed quality on the incinerator site - Quality requirements depend on the technical design of the installation (see above), - Waste input can be stored and/or mixed in order to fulfill the requirements (depending on national legislative requirements). - Key substances/properties are mercury, alkali metals and heavy-metals, iodine and bromine, chlorine and sulphur, variations in heat values/moisture content, critical organic pollutants e.g. PCBs, physical consistency of waste e.g. sewage sludge, mixability of different kind of waste	No
	4.1.3.4 Checking, sampling and testing incoming wastes A suitable regime for the assessment of incoming waste must be in place. - that the wastes received are within the range suitable for the installation, - whether the wastes need special handling/storage/treatment/removal for off-site transfer, - whether the wastes are as described by the supplier (for contractual, operational or legal reasons).	Usually not
	The techniques adopted vary from simple visual assessment to full chemical analysis. The extent of the procedures adopted will depend upon: - nature and composition of waste, - heterogeneity of the waste, - known difficulties with wastes (of a certain type or from a certain source), - specific sensitivities of the installation concerned (e.g. certain substances known to cause operational difficulties), - whether the waste is of a known or unknown origin - existence or absence of a quality controlled specification for the waste, - whether the waste has been dealt with before and experiences with it. See also table 4.3 (p. 213)	Usually not
	4.1.3.5 Detectors for radioactive materials - Radioactive materials can often be detected using specific detectors situated at, for example, the entrance to the plant.	Partly

No.	BAT according to BREF document on Waste Incineration (2006)	Realised in MSWI
5	**Does the storage of the waste reflect the risk potential of the waste in a way that risks are minimised?** 4.1.4.1 Sealed surfaces, controlled drainage and weatherproofing □ See table 4.4 (p. 216)	**Usually yes**
6	**Are techniques applied in order to reduce storage of waste and to manage time of starage in order to reduce risks from storage including aging of containers?** 4.1.4.2. Management of storage times □ preventing the volumes of wastes stored from becoming too large □ • controlling and managing deliveries (where possible) by communication with waste suppliers, etc.	**Frequently not**
7	**Are measures taken to reduce odor and emission of volatile substances from stored wastes and from pre-treatment areas?** 4.1.4.4 Extraction of incineration air from storage areas for odour, dust and fugitive release control □ The incinerator air supply (primary or secondary) can be taken from the waste (or chemical) storage areas. □ By enclosing the waste storage areas and limiting the size of the entrances to the waste storage areas, the whole waste storage area can be maintained under a slight negative pressure. □ See table 4.5 (p. 220).	**Usually yes**
	Are measures taken that control sources of odor and emission of volatile substances even when the plant is not operational? □ Prevention of overload in storage area □ Use of alternative odor control systems	**Usually not**
8	**Is a segregation of waste types regarding their chemical and physical characteristics in place in order to ensure correct storage and process operation?** 4.1.4.5. Segregation of waste types for safe processing □ checking, sampling and assessment of incoming wastes □ segregation techniques, see table 4.6 (p 221)	**Usually not**

No.	BAT according to BREF document on Waste Incineration (2006)	Realised in MSWI
9	**Is a clear individual labelling of contained waste loads in place?** 4.1.4.6 Individual labelling of contained waste loads ☐ application of European List of Waste ☐ Identification of waste by origin In general, waste delivery is accompanied by a suitable description of the waste; an appropriate assessment of this description and the waste itself forms a basic part of waste quality control. An indicative list of the most important parameters for labelling includes: ☐ name and address of the deliverer, ☐ origin of the waste, ☐ volume, ☐ water and ash content, ☐ calorific value, ☐ concentration of chlorides, fluorides, sulphur and heavy metals.	**Usually not**
10	**Is a management plan for prevention, detection and control of fire operational?**	Usually yes
11	**Is mixing of waste (e.g. by crane) and/or pre-treatment (e.g. by shredding) in place for heterogeneous wastes in order to achieve specific installation requirements?** ☐ See also table 4.1.5.1 (p. 224)	Usually yes
19	**It is BAT to chose operation conditions (e.g. temperature, residence time, turbulences) as required by Directive 2000/76**	Usually yes
41	**Are BAT techniques for the prevention of PCDD/F emissions applied?**	Usually yes
42	**Are measure taken for prevention memory effect uptake in wet scrubbers and the associated risk of breakthrough and de-sorption releases?**	Usually yes
43	**In case materials are recirculated within the installation: Are measure taken to ensure that this is accompanied by outlets for those materials that may accumulate (e.g. Hg)?**	Usually yes
45	**Are BAT control mechanisms applied in cases where activated carbon is injected for Hg adsorption.** ☐ see table 4.4.6.2	Usually yes

No.	BAT according to BREF document on Waste Incineration (2006)	Realised in MSWI
69	In addition to the quality controls outlined in BAT4, at HWI to use specific systems and procedures, using a risk based approach according to the source of the waste, for the labelling, checking, sampling and testing of waste to be stored/treated (see 4.1.3.4). Analytical procedures should be managed by suitable qualified personnel and using appropriate procedures. In general equipment is required to test: □ the calorific value □ the flashpoint □ PCBs □ Halogens (e.g. Cl, Br, F) and sulphur □ heavy metals □ waste compatibility and reactivity □ radioactivity (if not already covered by BAT3 through fixed detectors at the plant entrance). Knowledge of the process or origin of the waste is important as certain hazardous characteristics, (for example toxicity or infectiousness) are difficult to determine analytically.	
70	It is BAT to mix, blend and pre-treat waste waste in order to improve its homogeneity, combustion characteristics and burn-out to a suitable degree with due regard to safety considerations. Examples are the shredding of drummed and packaged hazardous wastes, described in 4.1.5.3 and 4.1.5.6. If shredding is carried out then blanketing with an inert atmosphere should be carried out.	
71	BAT is the use of a feed equalisation system for solid hazardous wastes (e.g. as described in 4.1.5.4 or other similar feeding technology) in order to improve the combustion characteristics of the fed waste and to improve the stability of flue-gas composition including the improved control of short-term CO peak emissions.	
72	BAT is the direct injection of liquid and gaseous hazardous wastes, where those wastes require specific reduction of exposure, releases or odour risk, as described in 4.1.6.3.	
73	BAT is the use of a combustion chamber design that provides for containment, agitation and transport of the waste, for example: rotary kilns - either with or without water cooling. Water cooling for rotary kilns (see **Fehler! Verweisquelle konnte nicht gefunden werden.**), may be favourable in situations where: a. the LHV of the fed waste is higher (e.g. >15 – 17 GJ/tonne), or b. higher temperatures e.g. >1100 °C are used (e.g. for ash slagging or destruction of specific wastes)	

No.	BAT according to BREF document on Waste Incineration (2006)	Realised in MSWI
74	It is BAT to reduce installation energy demand and in general, and to achieve an average installation electrical demand (excluding pretreatment or residue treatment) of generally below 0.3 – 0.5 MWh/tonne of waste processed (see 3.5.5 and 4.3.6). Smaller installations generally result in consumption levels at the upper end of this range. Weather conditions may have a significant impact on consumption owing to heating requirements etc.	
75	BAT is for merchant HWI and other hazardous waste incinerators feeding wastes of highly varying composition and sources, the use of: a. wet FGT, as described in 4.4.3.1, is generally BAT to provide for improved control of short-term air emissions (see concluding remarks 7.4.3 ref. other systems and BAT37 regarding FGT system selection) b. specific techniques for the reduction of elemental iodine and bromine emissions, as described in 4.4.7.1, where such substances exist in the waste at appreciable concentrations	

4.2 Best Available Technique according to BREF document on Waste Treatment

The BAT document of Waste Treatment describes in chapter 5 best available techniques for the treatment of wastes.

Again, the compilation of BAT requirements as shown on the following pages reveal that relevant requirements are often not fulfilled by MSWI, when hazardous wastes would be accepted.

No.	BAT according to BREF document on Waste Treatment	Realised in MSWI
4	BAT is to try to have a close relationship with the waste producer/holder in order that the customers sites implement measures to produce the required quality of waste necessary for the waste treatment process to be carried out (see Section 4.1.2.9)	**usually not**
6	BAT is to have a concrete knowledge of the waste IN. Such knowledge needs to take into account the waste OUT, the treatment to be carried out, the type of waste, the origin of the waste, the procedure under consideration (see BAT number 7 and 8) and the risk (related to waste OUT and the treatment) (see Section 4.1.1.1). Guidance on some of these issues is provided in Sections 4.2.3, 4.3.2.2 and 4.4.1.2	**partly**
7	In order to ensure good knowledge about the wast input it is BAT to implement a pre-acceptance procedure containing at least the following items (see Section 4.1.1.2):	
	a. tests for the incoming waste with respect to the planned treatment	**Usually not**
	b. making sure that all necessary information is received on the nature of the process(es) producing the waste, including the variability of the process. The personnel having to deal with the pre-acceptance procedure need to be able due to his profession and/or experience to deal with all necessary questions relevant for the treatment of the wastes in the WT facility	**Usually not**
	c. a system for providing and analysing a representative sample(s) of the waste from the production process producing such waste from the current holder	**Usually not**
	d. a system for carefully verifying, if not dealing directly with the waste producer, the information received at the pre-acceptance stage, including the contact details for the waste producer and an appropriate description of the waste regarding its composition and hazardousness	**Usually not**
	e. making sure that the waste code according to the European Waste List (EWL) is provided	**Yes**
	f. identifying the appropriate treatment for each waste to be received at the installation (see Section 4.1.2.1) by identifying a suitable treatment method for each new waste enquiry and having a clear methodology in place to assess the treatment of waste, that considers the physico-chemical properties of the individual waste and the specifications for the treated waste.	**Partly**
8	In order to ensure good knowledge about the wast input it is BAT to implement an acceptance procedure containing at least the following items (see Section 4.1.1.3):	
	a. a clear and specified system allowing the operator to accept wastes at the receiving plant only if a defined treatment method and disposal/recovery route for the ouput of the treatment is determined (see pre-acceptance in BAT number 7). Regarding the planning for the acceptance, it needs to be guaranteed that the necessary storage (see Section 4.1.4.1), treatment capacity and dispatch conditions (e.g. acceptance criteria of the output by the other installation) are also respected	**partly**

No.	BAT according to BREF document on Waste Treatment	Realised in MSWI
	b. measures in place to fully document and deal with acceptable wastes arriving at the site, such as a pre-booking system, to ensure e.g. that sufficient capacity is available	**Yes**
	c. clear and unambiguous criteria for the rejection of wastes and the reporting of all non conformances	**partly**
	d. a system for identifying the maximum capacity limit of waste that can be stored at the facility (related to BAT number 10.b, 10.c, 27 and 24.f)	**partly**
	e. visually inspect the waste IN to check compliance with the description received during the pre-acceptance procedure. For some liquid and hazardous waste, this BAT is not applicable (see Section 4.1.1.3)..	**Usually yes**
9	In order to improve knowledge about waste input it is BAT to implement an acceptance procedure containing at least the following items (see Section 4.1.1.3):	
	a. a clear and specified system allowing the operator to accept wastes at the receiving plant only if a defined treatment method and disposal/recovery route for the ouput of the treatment is determined (see pre-acceptance in BAT number 7). Regarding the planning for the acceptance, it needs to be guaranteed that the necessary storage (see Section 4.1.4.1), treatment capacity and dispatch conditions (e.g. acceptance criteria of the output by the other installation) are also respected	**Usually not**
	b. measures in place to fully document and deal with acceptable wastes arriving at the site, such as a pre-booking system, to ensure e.g. that sufficient capacity is available	**Usually not**
	c. clear and unambiguous criteria for the rejection of wastes and the reporting of all non conformances	**Usually not**
	d. a system for identifying the maximum capacity limit of waste that can be stored at the facility (related to BAT number 10.b, 10.c, 27 and 24.f)	**Usually not**
	e. visually inspect the waste IN to check compliance with the description received during the pre-acceptance procedure. For some liquid and hazardous waste, this BAT is not applicable (see Section 4.1.1.3).	**Usually not**
10	In order to improve knowledge about waste input it is BAT to have a reception facility covering at least the following issues (see Section 4.1.1.5):	
	a. have a laboratory to analyse all the samples at the speed required by BAT. Typically this requires having a robust quality assurance system, quality control methods and maintaining suitable records for storing the analyses results. *Particularly for hazardous wastes, this often means that the laboratory needs to be on-site.*	Usually not
	b. have a dedicated quarantine waste storage area as well as written procedures to manage non-accepted waste. If the inspection or analysis indicates that the wastes fail to meet the acceptance criteria (including, e.g. damaged, corroded or unlabelled drums) then the wastes can be temporarily stored there safely. Such storage and procedures should be designed and managed to promote the rapid management (typically a matter of days or less) to find a solution for that waste	Partly

No.	BAT according to BREF document on Waste Treatment	Realised in MSWI
	c. have a clear procedure dealing with wastes where inspection and/or analysis prove that they do not fulfil the acceptance criteria of the plant or do not fit with the waste description received during the pre-acceptance procedure. The procedure should include all measures as required by the permit or national/international legislation to inform competent authorities, to safely store the delivery for any transition period or to reject the waste and send it back to the waste producer or to any other authorised destination	Usually yes
	d. move waste to the storage area only after acceptance of the waste (related to BAT number 8)	Usually not
	e. mark the inspection, unloading and sampling areas on a site plan	Partly
	f. have a sealed drainage system (related to BAT number 63)	Partly
	g. a system to ensure that the installation personnel who are involved in the sampling, checking and analysis procedures are suitably qualified and adequately trained, and that the training is updated on a regular basis (related to BAT number 5)	Partly
	h. the application of a waste tracking system unique identifier (label/code) to each container at this stage. The identifier will contain at least the date of arrival on-site and the waste code (related to BAT number 9 and 12)	Partly
12	BAT is to have a system in place to guarantee the traceability of waste treatment. Different procedures may be needed to take into account the physico-chemical properties of the waste (e.g.liquid, solid), type of WT process (e.g. continuous, batch) as well as the changes that may occur to the physico-chemical properties of the wastes when the WT is carried out. A good traceability system contains the following items (see Section 4.1.2.3):	Usually not
	a. documenting the treatments by flow charts and mass balances (see Section 4.1.2.4 and this is also related to BAT number 2.a)	**Usually not**
	b. carrying out data traceability through several operational steps (e.g. pre-acceptance/ acceptance/ storage/ treatment/ dispatch).	**Usually not**
	Records can be made and kept up-to-date on an ongoing basis to reflect deliveries, on-site treatment and dispatches. Records are typically held for a minimum of six months after the waste has been dispatched.	**Partly**
	c. recording and referencing the information on waste characteristics and the source of the waste stream, so that it is available at all times. A reference number needs to be given to the waste and needs to be obtainable at any time in the process to enable the operator to identify where a specific waste is in the installation, the length of time it has been there and the proposed or actual treatment route	**Usually not**
	d. having a computer database/series of databases, which are regularly backed up. The tracking system operates as a waste inventory/stock control system and includes: date of arrival on-site, waste producer details, details on all previous holders, an unique identifier, pre-acceptance and acceptance	**Partly**

No.	BAT according to BREF document on Waste Treatment	Realised in MSWI
	analysis results, package type and size, intended treatment/disposal route, an accurate record of the nature and quantity of wastes held on-site including all hazards details on where the waste is physically located in relation to a site plan, at which point in the designated disposal route the waste is currently positioned	
	e. only moving drums and other mobile containers between different locations (or loaded for removal off site) under instructions from the appropriate manager, ensuring that the waste tracking system is amended to record these changes (see Section 4.1.4.8).	**Partly**
13	BAT is to have and apply mixing/blending rules oriented to restrict the types of wastes that can be mixed/blended together in order to avoid increasing pollution emission of downstream waste treatments. These rules need to consider the type of waste (e.g. hazardous, non-hazardous), waste treatment to be applied as well as the following steps that will be carried out to the waste OUT (see Section 4.1.5)	**Partly**
14	BAT is to have a segregation and compatibility procedure in place (see Section 4.1.5 and this is also related to BAT number 13 and 24.c), including:: a. keeping records of the testing, including any reaction giving rise to safety parameters (increase in temperature, generation of gases or raising of pressure), a record of the operating parameters (viscosity change and separation or precipitation of solids) and any other relevant parameters, such as generation of odours (see Sections 4.1.4.13 and 4.1.4.14) b. packing containers of chemicals into separate drums based on their hazard classification. Chemicals which are incompatible (e.g. oxidisers and flammable liquids) should not be stored in the same drum (see Section 4.1.4.6).	**Partly**

5 Summary of findings

The analysis revealed that further clarifications and definitions are crucial in order to make the energy efficiency formula of the Waste Framework Directive operational without provoking adverse environmental effects. The following elements should be considered when further elaborating the implementation of the formula:

a) develop monitoring and control mechanism for the actual performance of the plant in day-to-day operation; this monitoring shall be performed in addition to the principal determination of the technical capabilities of the installation to fulfil the R1-requirements,

b) clarification and definition for the approach to be taken for the recurring determination of energy efficiency of the installation in time periods shorter than 12 months shall be done,

c) development resp. definition of criteria, procedures and time frames for withdrawal of the R1-status where necessary on European level,

d) consideration of the principal capability of wastes to provide to the status of R1-installations (e.g. exclude wastes with a low calorific value),

e) taking account of the fact that recital 20 of the Waste Framework Directive 2008/98/EC exclusively refers to municipal waste when possible recovery status of wastes is determined e.g. by explicitly excluding other than municipal solid wastes from the R1-status of dedicated municipal solid waste incinerators[7],

f) ensure harmonisation of applied criteria for the R1-status in detail and the monitoring and control of the status in all Member States,

g) determine system boundaries in a way that, at least, drying of wastes that is done directly before the incineration of that waste is included in the calculation of the energy efficiency of the operation; if this is deemed not to be possible wastes with usually high water content can be excluded from a R1-status.

A cursory preliminary evaluation of potential options for solving the issues revealed that, in some cases it might be hardly possible to find a solution on purely scientific basis. It will be rather necessary to agree on approaches which have more the character of conventions and which are seen as best possible approach to fulfil the objective of the Waste Framework Directive in all aspects. In order to achieve such a solution, the participation of all relevant stakeholders must be ensured.

[7] Recital 20 of Directive 2008/98/EC says: "This Directive should also clarify when the incineration of municipal solid waste is energy-efficient and may be considered a recovery operation".

It is stressed at this point that the proposals made so far are not meant as a critique of the energy efficiency formula as such. It is rather seen as necessary to solve the raised issues in the light of the requirements of the "Thematic Strategy on Prevention and Recycling" and in the context of the interpretation and adaptation to technical progress according to Article 38 of the Waste Framework Directive[8].

The analysis of BAT reference documents on waste incineration and waste treatment revealed that the BAT techniques required for the incineration of hazardous wastes are not realised in many municipal waste incinerators. This is true especially regarding the BAT on waste acceptance procedures but also regarding storage of waste and appropriate treatment. The major deficit of municipal waste incinerators regarding the incineration of hazardous waste is seen in the missing capabilities for on-site analysis. Because the hazard potential of waste (especially from pre-mixing) does vary often, all BAT requirements related to improvement of knowledge about the composition of the waste are of high relevance.

Thus it is seen as important that the further development of the R1-formula will not support the incineration of hazardous wastes in installations that have a lower environmental protection level than installations which are built for the incineration of hazardous wastes.

[8] "If necessary, the application of the formula for incineration facilities referred to in Annex II, R1, shall be specified."

6 References

BREF WI: European Commission: Reference Document on the Best Available Techniques for Waste Incineration, August 2006

Directive 2008/98/EC of the European Parliament and Council of 19. November 2008 on Waste and repealing of certain Directives

TSPR: COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THHE COMMITTEE OF THE REGIONS Taking sustainable use of resources forward: A Thematic Strategy on the prevention and recycling of waste, COM(2005) 666 final

vdi 2006: Bewertung der Energieeffizienz in Anlagen zur thermischen Abfallbehandlung - Stellungnahme des Ausschusses VDI 3460 der Kommission Reinhaltung der Luft im VDI und DIN – Normenausschuss KRdL - 15.11.2006 –

7 Annex I: Summary of the statement of vdi of 15.11.2006

[Bewertung der Energieeffizienz in Anlagen zur thermischen Abfallbehandlung Stellungnahme des Ausschusses VDI 3460 der Kommission Reinhaltung der Luft im VDI und DIN – Normenausschuss KRdL - 15.11.2006]

„Die Kommission Reinhaltung der Luft im VDI und DIN hat im Mai 2006 die Richtlinie VDI 3460 Blatt 2 „Emissionsminderung – Energieumwandlung bei der thermischen Abfallbehandlung" im Entwurf vorgelegt. In diesem Richtlinienentwurf wird dargelegt, wie bei der Ermittlung der Energieeffizienz in thermischen Abfallbehandlungsanlagen methodisch vorzugehen ist. Die Einbeziehung der Berechnungsgleichung in dem Entwurf der Abfallrahmenrichtlinie wurde als nicht zweckmäßig erachtet. Wesentliche Kritikpunkte an der in dem Entwurf der Abfallrahmenrichtlinie dargestellten Berechnungsgleichung sind:

1. In der Berechnungsgleichung in dem Entwurf der Abfallrahmenrichtlinie steht die als Zusatzenergie eingetragene Energie Ef als Aufwand im Nenner der Gleichung. Sie stellt aber keinen Aufwand für den zugehörig zu ermittelnden Nutzen (Netto-Energie) dar. Die Gleichung entspricht somit formal nicht der Definition eines Wirkungsgrades.

2. Die Berechnungsgleichung in dem Entwurf der Abfallrahmenrichtlinie berücksichtigt Verluste „aufgrund von Rost- und Kesselasche sowie von Strahlung" mit einem Faktor kleiner 1 (0,97) im Nenner. Das führt rechnerisch zu einem verminderten Aufwand. Mit zunehmenden Verlusten ergibt sich damit eine zunehmend bessere Energieeffizienz der Anlage.

3. Für die Ermittlung der Energieinhalte unterschiedlicher Energiearten werden in der Berechnungsgleichung in dem Entwurf der Abfallrahmenrichtlinie Äquivalenzfaktoren verwendet, was aus thermodynamischer Sicht nicht zulässig ist. Äquivalenzfaktoren besitzen die Eigenschaft von Mittelwerten und sind daher nur für Überschlagsrechnungen, jedoch nicht für die Bilanzierung konkreter Anlagen geeignet.

4. In der Berechnungsgleichung in dem Entwurf der Abfallrahmenrichtlinie ist es für die Abgrenzung zwischen Ef und Ei erforderlich, Zusatzbrennstoffe „die zur Erzeugung von Dampf beitragen" von solchen Zusatzbrennstoffen zu unterscheiden, bei denen dies nicht der Fall ist. Diese Unterscheidung ist für die Ermittlung der Energieeffizienz irrelevant.

5. In der praktischen Anwendung der Berechnungsgleichung in dem Entwurf der Abfallrahmenrichtlinie kommt es zu Schwierigkeiten und u. U. auch zu erheblichen Fehlern, da die Zuordnung der einzelnen Energieströme (Ep, Ei, Brutto-, Nettoerzeugung, Eigenbedarf usw.) methodisch nicht vorgegeben ist (z. B. als schlüssiges Bilanzierungsschema mit den zu bewertenden Bilanzkreisen und allen an diesen Bilanzkreisen ein- und austretenden Energieströmen).

Insgesamt entspricht der Vorschlag für die Ermittlung der Energieeffizienz nach dem Entwurf der Abfallrahmenrichtlinie damit nicht einer als richtig anerkannten, auf wissenschaftlichen Erkenntnissen und praktischen Erfahrungen beruhenden Darstellung des Standes der Technik und kann deshalb auch keinen Maßstab für einwandfreies technisches Vorgehen bilden, so wie dies für VDI-Richtlinien gefordert wird."

Appendix 5

Acceptance criteria for hazardous waste for incineration in the AEB grate furnace Version 1.2, March 2011

Technical process criteria:

- Flame point > 100 °C measured over the entire load.
  - A limited quantity of materials with a lower flame point may be delivered provided these are sealed and unbreakably packed.
- Melting point of solid waste > 250 °C (in connection with falling through the grate).
- Calorific value < 25,000 kJ/kg.
- Waste materials must not be highly toxic, strongly smelling, demonstrably carcinogenic or otherwise pose a threat to public health.
- Waste materials may not give off dust during loading, unloading or processing.
- Maximum size for solid materials: lumps of ± 5 kg. Minimum size of fragments is 5 mm.
- Ash residues (dry matter) after incineration should be less than 50%.
- Waste materials may not have a highly adhesive effect on the waste present in the bunker.
- The pH value of the waste should be between 5 and 9.
- Glass < 20 M%
- Tin / metals < 5 M%

Criteria related to environmental hygiene:

- Waste materials should burn rather than melt.
- Sulphur < 4 M%. Additional processing charges apply for sulphur contents > 0.1 M%. See Appendix 2.
- Organic chlorine < 4 M%. Additional processing charges apply for chlorine contents > 1 M%. See Appendix 2.
- Organic fluorine < 0.1 M%.
- Bromine and iodine < 0.1 M%.

- The heavy metal content must be lower than specified in Appendix, with a downward adjustment for:
- Antimony: < 25 mg/kg dry matter.
- Molybdenum: < 5 mg/kg dry matter.
- Copper: < 1,000 mg/kg dry matter.
- Nickel: < 1,000 mg/kg dry matter.

Occupational hygiene aspects:

- The delivered waste materials may not be toxic, dust-emitting or strongly smelling. The delivery of potentially infectious waste (needles and syringes) is prohibited.

The waste streams listed below may be delivered in mixed form.

Category	Description	Comments
304	**Glues, resins and sealants**	▪ Sealant and glue cylinders with product residues ▪ Sealant and glue tubes with product residues ▪ Sealant and glue buckets with product residues (maximum 10 kg and/or 40 litres) ▪ **No uncontained liquids** ▪ Waste must be deposited separately: no batches stuck together. ▪ Waste from production or expired batches is only accepted in consultation ▪ **No tar and/or bituminous waste** ▪ **No large quantities of silicones: maximum 1% of container contents**
305.b	**Latex paint and water-based paint**	Deliver in liquid-tight containers Maximum package size: 30 litres Only plastic packages: maximum of 5% cans **No uncontained liquids**
306.b	**Ink (water-based)**	See 305.b

Written by: Jeroen Wies
Date: 31-3-2011

309	**Office chemical waste**	▪ Ink / printer ribbons ▪ Packages of/containing toner powder ▪ Toner cartridges ▪ Pens, markers, etc. ▪ Diskettes	**Not office waste:** ▪ Liquids ▪ Batteries ▪ Fluorescent lamps ▪ Loose toner powder
10	**Oil-containing garage waste**	▪ Absorbent material soiled with oil, coolants or brake fluid ▪ Soil contaminated with oil, max. 1 m^3 ▪ Cleaning cloths soiled with oil or polishing fluids (flame point > 100 °C) ▪ Hydraulic tubes (maximum 5% and no longer than 1 metre) ▪ Oil/fuel filters (flame point > 100 °C)	**Not oil-containing garage waste:** ▪ Uncontained liquids ▪ Metal packaging or other objects other than connectors on hydraulic tubes ▪ The percentage of cans/metal must be less than 5%
312	**Medicines and cosmetics**	1 Solid medicines and cosmetics: a) Medicines and cosmetics in consumer packaging 2 Liquid medicines: a) Medicines diluted with organic substances (alcohol, ether, etc.): maximum package size 50 ml b) Medicines diluted with water (cough syrup, contact lens fluid, etc.): maximum package size 2.5 litres	
329	**Cleaning cloths soiled with chemicals**	See also 310: Oil-containing garage waste	
704	**Empty packaging and containers**	▪ Empty, uncleaned combustible chemical packaging: ▪ Maximum size 60 litres. Larger packages must be made smaller. ▪ Big bags (FIBCs) must be rolled up and tied together using a tie-wrap. ▪ Empty packaging must be delivered without lids or caps. ▪ The percentage of cans/metal must be less than 5%. Max. content of cans: 20 litres. ▪ The percentage of glass must be less than 20%. ▪ **No uncontained liquids** ▪ **No steel drums**	

Arrangement of deliveries

AEB places great importance on proper planning with respect to bulk hazardous waste and has the following rules regarding the arrangement of deliveries:

- Notice of a delivery must be given at least one working day before the desired delivery date. Telephone 020-5876250 to arrange a delivery date and time.
- Send a fax on the same day to confirm the delivery. The fax should state the delivery date and time, type of waste, waste stream number, number of containers and transport company. Fax number: 020-5876270
- Hazardous waste can be delivered on Mondays, Tuesdays, Wednesdays, Thursdays and Friday mornings. Deliveries on Friday may not be possible if depot levels do not permit this. In order to avoid waiting times and ensure efficient processing, the delivery times are assigned in blocks.
- AEB reserves the right to delay or refuse deliveries if the planned block times are not adhered to. A maximum of three semi-trailer trucks (6 containers) can be handled per block. Delivery of sludge or filter cake is only possible in blocks 1 and 3, at a maximum of 35 tonnes per day.
- Each truck/semi-trailer is weighed a maximum of two times: once for the tractor and once for the trailer. If a semi-trailer truck is delivering two waste streams, each waste stream must have a separate accompanying document. The delivery of more than two waste streams per semi-trailer truck is not permitted. Automatic weighing is not possible if a semi-trailer truck needs to be weighed twice.
- Deliveries for which notice has been given only by telephone (without confirmation by fax) or fax (without making an arrangement by telephone), will be regarded as unannounced and will be refused.

Written by: Jeroen Wies
Date: 31-3-2011

Appendix 1: Maximum concentrations for accepted hazardous waste.

Class A
Concentration limit: 50 mg/kg

A.1 Antimony and antimony compounds
A.2 Arsenic and arsenic compounds
A.3 Beryllium and beryllium compounds
A.4 Cadmium and cadmium compounds
A.5 Chrome (VI) compounds
A.6 Mercury and mercury compounds
A.7 Selenium and selenium compounds
A.8 Tellurium and tellurium compounds
A.9 Thallium and thallium compounds
A.10 Inorganic cyanides
A.11 Metal carbonyls
A.12 Naphthalene
A.13 Anthracene
A.14 Phenanthrene
A.15 Chrysene, benzo[a]anthracene, fluoranthene, benzo[a]pyrene, benzo[k]fluoranthene, indenol[1, 2, 3-cd]pyrene and benzo[ghi]perylene.
A.16 Halogenated compounds of aromatic rings, such as polychlorinated biphenyls, polychloroterphenyls and their derivatives.
A.17 Halogenated aromatic compounds.
A.18 Benzene
A.19 Dieldrin, aldrin and endrin.
A.20 Organo-tin compounds

Class B
Concentration limit: 5,000 mg/kg

B.1 Chrome (III) compounds
B.2 Cobalt compounds
B.3 Copper compounds
B.4 Lead and lead compounds
B.5 Molybdenum compounds
B.6 Nickel compounds
B.7 Tin compounds
B.8 Vanadium compounds
B.9 Tungsten compounds
B.10 Silver compounds
B.11 Organic halogen compounds
B.12 Organo-phosphorus compounds
B.13 Organic peroxides
B.14 Organic nitro- and nitroso-compounds
B.15 Organic azo- and azoxy-compounds
B.16 Nitriles
B.17 Amines
B.18 (Iso- and thio-) cyanates
B.19 Pheno- and phenolic compounds
B.20 Mercaptans
B.21 Asbestos
B.22 Halogen silanes
B.23 Hydrazine(s)
B.24 Fluorine
B.25 Chlorine
B.26 Bromine
B.27 White and red phosphorus
B.28 Ferro-silicate and -alloys
B.29 Manganese silicate
B.30 Halogen-containing compounds which produce acidic vapours on contact with humid air or water, e.g. silicon tetrachloride, aluminium chloride, titanium tetrachloride.

Written by: Jeroen Wies
Date: 31-3-2011

Class C
Concentration limit: 20,000 mg/kg

C.1 Ammonia and ammonium compounds
C.2 Inorganic peroxides
C.3 Barium compounds except barium sulphate
C.4 Fluorine compounds
C.5 Phosphorus compounds except phosphates of aluminium, calcium and iron
C.6 Bromates, (hypo-)bromites
C.7 Chlorates, (hypo-)chlorites
C.8 Aromatic compounds
C.9 Organic silicon compounds
C.10 Organic sulphur compounds
C.11 Iodates
C.12 Nitrates, nitrites
C.13 Sulphides
C.14 Zinc compounds
C.15 Salts of per-acids
C.16 Acid halogenides, acid amides
C.17 Acid anhydrides

Class D
Concentration limit: 50,000 mg/kg

D.1 Sulphur
D.2 Inorganic acids
D.3 Metal hydrogen sulphates
D.4 Oxides and hydroxides except those of hydrogen, carbon, silicon, iron, aluminium, titanium, manganese, magnesium, calcium
D.5 Aliphatic and naphthenic hydrocarbons
D.6 Organic oxygen compounds
D.7 Organic nitrogen compounds
D.8 Nitrides
D.9 Hydrides

Class E
No concentration limit

E.1 Highly flammable substances
E.2 Substances that produce a dangerous quantity of highly flammable gas if they come into contact with water or humid air.

Appendix 6

ASDONKSHOF
Entsorgungskompetenz am Niederrhein

Auszug aus dem Planänderungs- und ergänzungsbeschluß vom 22.01.1997 - 56.8851.8.1-4044

4.3.4 Richtwerte für die Annahme von Abfällen zur Verbrennung

4.3.4.1
Für die Annahme von Abfällen - mit Ausnahme von Hausmüll (EAK-Nr. 20 03 01) sowie Klärschlamm (EAK 19 08 05) - gelten folgende Richtwerte:

a) Stoffe mit Mengenbeschränkung in Gew.-%

Chlor	< 4 (1)
Schwefel	< 3 (1)

b) Konzentrationen der einzelnen Elemente und Stoffgruppen in mg/kg Trockensubstanz

Blei	< 3.300
Zink	< 2.400
Cadmium	< 35
Chrom	< 4.000
Kupfer	< 1.300
Quecksilber	< 5
Arsen	< 20
Nickel	< 500
Thallium	< 2
PCB nach DIN	< 10
Chlorbenzol	< 10
PCP	< 10

c) Sonstige Merkmale

Abfalltemperatur	< 40° C
Flammpunkt	> 55° C
Schmelzpunkt	> 100° C
pH-Wert	3 – 12

Diese Grenzwerte sind bei der Anlieferung von Abfällen zur Verbrennung einzuhalten. Im Einzelfall kann die Liste erweitert werden.

Bei Überschreitung einzelner Grenzwerte ist die Anlieferung nur nach gesonderter Abstimmung möglich.

Ergänzende Merkmale

Heizwertbestimmung für eine energetische Verwertung	≥ 11.000 kJ/kg
ggfs. Bestimmung PAK bei gewerbl. Brandschäden	Dioxin- und Furanuntersuchung

ENTSORGUNGSFACHBETRIEB
Einsammeln, Lagern, Behandeln, Verwerten, Beseitigen
ZEN-QMS e.V.

Appendix 7

INDAVER WASTE TO ENERGY FACILITY
CARRENSTOWN, CO. MEATH

ENVIRONMENTAL REPORT
on
PROPOSED CHANGES TO OPERATING CONDITIONS

prepared by

Professor Brian Broderick
Trinity College Dublin

for

An Bord Pleanala

1 Introduction

1.1 This report provides an evaluation of the environmental assessments presented by Indaver Ltd in support of proposed changes to their Waste to Energy facility at Carranstown, Co Meath [Ref PA0026]. Its purpose is to provide guidance and clarification on these issues for An Bord Pleanala.

1.2 The report has been compiled following a review of the submitted planning application documentation including the EIS, and some further information supplied by the Applicant; review of all other submissions made to An Bord Pleanala, including presentations made at the oral hearing; and of questioning at the oral hearing of the environmental experts who prepared the relevant parts of the EIS.

1.3 The following environmental issues are examined:

- the impacts associated with the acceptance and handling of additional waste types, including hazardous waste types;
- the impacts associated with the thermal treatment of hazardous waste types in the existing incinerator;
- the methodology and models employed to assess the air quality impact of increasing the quantity of waste processed at the facility from 200,000 tonnes pa to 220,000 tonnes pa, including up to 15,000 tonnes pa of hazardous waste;
- the predicted ambient concentrations of air pollutants expected to be emitted from the proposed facility.

1.4 The above impacts are evaluated taking into account the EU Reference Document on the Best Available Techniques (BREF) for Waste Incineration, EU Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe and the recently ratified Stockholm Convention on Persistent Organic Pollutants.

1.5 The EIS refers to the EU Waste Incineration Directive 2000/76/EC to define stack emission rates. From 2013, a new Industrial Emissions Directive (2010/75/EU) will incorporate and replace several directives regulating emissions from a range of industrial emission sources, including the Waste Incineration Directive (2000/76/EC). The provisions of the Waste Incineration Directive (2000/76/EC) have been largely maintained in the new Industrial Emissions Directive (2010/75/EU), including the maximum allowed emission rates for different air pollutants. For consistency with the EIS, this report also makes reference to the Waste Incineration Directive (2000/76/76).

2 Waste Types

2.1. The Indaver Waste to Energy facility at Carranstown is permitted to treat up to 200,000 tonnes of municipal solid waste (MSW) per annum. Indaver have applied to be allowed increase this to 220,000 tonnes pa, and within this amount, to be allowed to burn up to 15,000 tonnes pa of waste not classified as MSW.

2.2. The EIS states that motivation for increasing the permitted capacity of the facility to 220,000 tonnes pa is to exploit the full thermal and energy generating capability of the facility, which was designed with a capacity of 70 MW. As the calorific value of the MSW being treated at the facility is lower than anticipated, the facility has the capacity to treat a larger mass of waste.

2.3. The environmental benefits of utilizing the full capacity of the facility include a reduced quantity of waste landfilled or exported, more optimum combustion conditions and maximum possible electrical power generation.

2.4. The additional non-MSW types for which permission has been sought have been identified in a list of EWC codes presented in the EIS. These include both hazardous and non-hazardous waste. The EIS illustrates these types by giving examples of each. A submission on the application states that these examples omit other forms of waste that are associated with a wider range of hazards. In another submission, Veolia Environmental Services (VES) observe that some of the wastes types covered by the requested additional EWC codes have lower calorific value than MSW, and as such will not contribute to the Applicant's stated aim of utilizing the full thermal capacity of the facility.

2.5. At the oral hearing, the Applicant responded to these submissions by clarifying that it is not intended to accept all waste types covered by the additional EWC codes at the facility. In effect, the Applicant plans to process only 'suitable' waste types that are compatible with the safe and optimum operation of the facility. The waste types will be accepted considering (i) their effect on the combustion process and (ii) the existing facility's capacity to accommodate any hazards they present. Further questioning at the oral hearing addressed the waste acceptance criteria to be employed in considering these issues. However the EIS does not contain a comprehensive set of criteria that cover all of these issues, nor was one presented at the oral hearing.

2.6. At the oral hearing, the Applicant placed greater emphasis on the opportunity offered by the facility to reduce the amount of hazardous waste being exported for treatment. The Applicant described how some of the hazardous waste types covered by the requested additional EWC codes can be treated using the current facilities and procedures without imposing any additional health, safety or environmental risks. Other waste types, even if included within the requested additional EWC codes, would not be accepted for treatment.

2.7. As set out in the EU Reference Document on the Best Available Techniques (BREF) for Waste Incineration, best practice in waste incineration includes designing facilities and their processes so that they are suited to the treatment of the expected waste types, taking account of physical and chemical characteristics. In service, controls over the waste received are necessary to ensure that only suitable material is processed. As the Indaver facility at Carranstown was conceived and designed as a MSW incinerator, it may not have the capability to receive and process many other forms of waste, each of which needs to be assessed on a case-by-case basis. Consequently, the applicant has applied to extend the range of waste processed at the facility to include hazardous waste, but to limit the types of hazardous waste received to those that are suitable for treatment in the facility.

2.8. The use of EWC codes does not appear to be a good method of regulating this approach, which may rely excessively on operator judgment and ongoing decision-making by the facility staff. While good practice and training can ensure that only suitable waste types will be generally accepted, the reliability of this approach and the associated risks have not been established. In addition, in the absence of a definitive list of the waste types deemed suitable for processing, or a comprehensive set of acceptance criteria, the associated environmental impacts are difficult to evaluate.

2.9. Carefully planned storage and management of waste prior to treatment is required to minimise pollution impacts, including odour releases. At the Carranstown facility, the waste delivery area is enclosed, and this helps avoid odour, noise and emission impacts. If the types of wastes received are diversified beyond the existing restriction to MSW only, then greater waste inspection requirements can be expected. This inspection will need to take place in the enclosed delivery area, and adequate provision will be needed for waste considered unsuitable for treatment following inspection. The Applicant has not provided detailed information on what arrangements will put in place in this regard, but it is unlikely that the current practice of unloading directly from delivery vehicles to the waste bunker will suffice for all the additional waste types received. Operational and safety challenges may also arise due to the mixing of hazardous and non-hazardous wastes in the bunker, as all waste in the bunker will then potentially need to be managed and handled as hazardous waste. Currently, this bunker acts as the principal storage location for waste awaiting treatment.

2.10. Clinical waste is included amongst the requested additional waste types. Clinical waste from hospitals or other health care locations may be thermally treated in dedicated facilities or in incinerators which treat a mixture of waste types, such as MSW or other hazardous wastes. However, clinical waste can be associated with specific risks not encountered with other general and hazardous waste types, and well defined and regulated handling and storage procedures are required to manage these safely, especially when infectious waste is being anticipated.

2.11. The submission by VES observed that segregated transfer, handling, inspection, container cleaning and storage facilities must be put in place when clinical waste is being processed. Details of these are not included in the planning application documents, but the issue was discussed by the Applicant at the oral hearing, with dedicated facilities for the direct unloading of clinical waste from individual bins into the bunker being envisaged. Although sharp clinical waste is covered by the requested additional EWC codes, the Applicant stated that they do not intend to accept such waste for treatment. Special provision will be made for the loading of infectious clinical waste directly into the furnace, by-passing the bunker.

2.12. It seems likely that the acceptance of clinical and some other forms of hazardous waste at the Carranstown facility will require additional facilities for inspection, storage and cleaning that have not been fully described by the Applicant, notwithstanding the intention that most of these activities will be performed off site. The potential environmental impacts associated with these activities include fugitive emissions to air and noise should operations not take place in an adequate

enclosed space, and contamination of water resources should operations not take place on purpose-built surfaces with controlled drainage.

2.13. The proposal to allow waste covered by additional EWC codes to be treated will create a hybrid MSW-hazardous waste facility. Only waste types that the Applicant considers suitable for treatment at the existing facility will be accepted, and consequently few changes to the current operating procedures have been planned. However, examination of some potentially suitable hazardous waste types has identified the need for additional process controls, and it is probable that new facilities will be required for the inspection of received wastes, segregated storage of rejected wastes and cleaning of containers. The potential environmental impacts of these new processes have not been identified or evaluated.

3 Treatment Processes

3.1. Two distinct processes are employed to treat waste at the Carranstown Waste-to-Energy facility: thermal treatment which reduces the volume and mass of the raw waste to a smaller quantity of bottom ash and flue gas treatment which removes most solid and gaseous pollutants from the combustion gases before discharge to the atmosphere. In both cases, the process capacity is sufficient to handle the requested extra 20,000 tonnes of waste, but with proportionate increases in environmental impacts.

3.2. With a waste treatment capacity of 200,000 tonnes pa, the Carranstown Waste to Energy facility is a medium-sized MSW facility by European standards. Thermal treatment of waste is performed using a moving grate furnace. As this type of furnace can have the capacity to treat relatively large quantities of waste it is commonly employed for the treatment of MSW. Moving grate furnaces are not commonly employed in facilities where a significant proportion of the waste is expected to be hazardous. In these cases, rotary kilns are favoured because the waste is enclosed and more complete burn-out can be achieved. The waste treatment capacity of rotary kilns is generally less than that of moving grate furnaces, typically in the range 30,000-100,000 tonnes pa.

3.3. The proposed treatment of a more diverse range of waste types other than MSW presents a risk to the operating performance of the facility. The combustion and environmental performance of incinerators is generally least good at start-up and shut-down when furnace temperature is variable. These issues were discussed at the oral hearing where the Applicant anticipated that the licencing authority would

require a programme of test burns to validate the performance of the facility under a wider range of waste treatment mixes.

3.4. Hazardous waste incinerators frequently employ special methods for handling waste and residues from the treatment processes. These include particular techniques for loading different wastes into the furnace, furnace design to achieve higher temperatures and incineration times and the extraction of non-ferrous metals. The only such measure proposed for the Carranstown facility is the direct injection of infectious clinical waste into the furnace. This limits the types of hazardous waste that can be processed at the facility, and should exclude some waste types that are covered by the requested additional EWC codes.

3.5. Clinical waste (especially non-infectious waste) can be processed in incineration facilities that also process other forms of waste such as MSW. However, the thermal treatment of clinical waste may require longer incineration times to ensure adequate burn-out and to accommodate the reduced calorific value of wastes with high moisture content.

3.6. The introduction of hazardous waste into the waste streams being thermally treated in the moving grate furnace could have implications for the classification of the bottom ash produced by the facility. Bottom ash is the principal residue from the waste introduced into the furnace which is either non-combustible or incompletely combusted. In some jurisdictions all bottom ash produced by a facility which treats hazardous waste is itself considered hazardous. In questioning at the oral hearing, the Applicant anticipated that this would not be case in Ireland and that instead a regime of bottom ash sampling and analysis would be established with the licencing authority to demonstrate that the non-hazardous nature of the ash. This regime is likely to be more intense in the initial period after the introduction of hazardous waste.

3.7. The Applicant emphasized that as the disposal costs for hazardous bottom ash are so much larger than those for non-hazardous ash, strong commercial imperatives exist for ensuring that hazardous ash is not produced by the thermal treatment process at Carranstown. The primary means of achieving this will be by only accepting suitable hazardous waste types that are known to produce non-hazardous bottom ash. These waste types were not specifically identified in the EIS or at the oral hearing as the Applicant intends to review these on an ongoing basis as potential sources of waste are identified. The interpretation of the likely success of this approach would benefit from a definitive set of waste acceptance criteria.

3.8. The existing flue gas treatment (FGT) system will have the capacity to treat the requested additional waste quantity and types. As the combustion products requiring treatment arising from the incineration of hazardous waste are the same as those arising from non-hazardous waste, no modifications to the FGT system will be required. While the quantities of some pollutants including mercury, heavy metals, HCl, HF, SO2 that will be required to be processed by the FGT system can be expected to be greater when some hazardous waste types are introduced, the concentrations of all contaminants discharged through the stack is expected to remain with permitted emission limits established by the Waste Incineration Directive.

3.9. The introduction of a wider range of waste types has no implications for the management of the FGT residues. The existing requirements for the storage, transfer and disposal of this material will continue to suffice. The 10% increase in capacity of the facility to 220,000 tonnes pa will imply an increase in the quantity of FGT residue produced by the facility.

4 Environmental Impacts

4.1 The environmental impacts of MSW and HW incineration plants include stack and fugitive emissions to air and their effect on air quality, emissions to water and their effect on water quality, residues (including bottom ash, boiler ash and flue gas treatment residues), odours, noise and vibration. These impacts are associated with plant processes and the transport of materials (waste and residues) to and from the plant.

4.2 An assessment of the air quality impacts of the increased stack emissions due to an increase in the facility waste treatment capacity to 220,000 tonnes pa is presented in the EIS. This assessment identifies the pollutants expected to be emitted through the stack, assembles data on background air quality from baseline measurements, determines expected average pollutant emission rates and employs dispersion modelling to determine the effect of these on ambient concentrations in the vicinity of the facility. These steps comprise an appropriate air quality assessment methodology for the proposed amendments to the facility operating conditions.

4.3 The air pollutants considered in the EIS are those whose emission rates are restricted by the Waste Incineration Directive (2000/76/EC). Supplementary information was presented by the Applicant at the oral hearing to describe the emissions of ultrafine particulates observed in similar facilities in Europe.

Information on the emissions of this pollutant is limited and it may not be possible to determine reliable emission rates or associated impacts. Cllr O'Dowd correctly observed that variations in key operating parameters including furnace temperature imply that emissions from one plant may not be representative of those from another.

4.4 The sources of fugitive emissions to air from the facility are not identified in the EIS which only evaluates air pollution emissions through the stack. The Applicant was asked to provide supplementary information on fugitive emissions associated with the receipt of hazardous waste at the facility. In most cases, these wastes will be transported and processed in sealed containers, and no fugitive emissions will arise. However, some hazardous wastes will be delivered as bulk materials in granular or liquid form, with the potential for fugitive emissions to the atmosphere.

4.5 Stack emissions at the facility are measured to ensure compliance with licencing conditions and to control treatment processes on an ongoing basis. Concentrations of gaseous pollutants are monitored continuously and concentrations recorded at short intervals. Particulate matter is sampled continuously, and the corresponding concentrations determined and recorded periodically. The stack concentrations of some pollutants of public concern are determined from the sampling and analysis of particulate matter. These include dioxins, chromium and heavy metals. The stack emissions monitoring at the facility follows best international practice, and the results obtained to date confirm that the emissions of all pollutants are within licenced levels.

4.6 The primary aim of the air quality assessment described in the EIS is to calculate the expected pollutant concentrations in the ambient air following an increase in facility capacity to 220,000 tonnes pa. These concentrations are then compared with limit (i.e. maximum allowable) values set down in EU Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe. A generally conservative approach is employed, including the use of the maximum emission rates allowed by the Waste Incineration Directive 2006/76/EC to define the stack emission rates used in dispersion modelling.

4.7 The introduction of hazardous wastes into mix of waste treated at the facility would not change the chemical or physical characteristics of the pollutants emitted through the stack. The combustion products resulting from the incineration of hazardous waste are the same as those resulting from the incineration of MSW. The more complex waste mix may give rise to increased emissions of some pollutants such as heavy metals, HCl, and SO2, but the

emission rates for all pollutants must still comply with the limit values set down in the Waste Incineration Directive. A third party submission by Mr Rountree anticipated that emissions of chromium VI would increase due to the incineration of some hazardous wastes, including paints. It is very possible that the emission rate for this pollutant would increase in these circumstances and future stack monitoring will need to ensure that emissions do not exceed permitted values.

4.8 The new status of the Stockholm Convention on Persistent Organic Pollutants (POPs) within Ireland was raised in a submission by Mr Herr. POPs are toxic substances with a long lifetime. As their environmental and health effects are experienced remote from the point of formation, both in time and space, they are regulated by international agreement. The POPs most associated with waste incineration are PCDDs and PCDFs, commonly known as dioxins. As described above, dioxin emissions from the facility are closely regulated and controlled.

4.9 The air quality assessment presented in the EIS is an update of the assessment presented in previous EISs for the same facility. The principal change is the increase in the stack gas volume flow rate to account for (i) the actual flow rates measured during operation of the facility (as opposed to the predicted flow rates used in previous EISs), and (ii) the expected increase in this flow rate due to an increase in facility capacity to 220,000 tonnes pa. These are combined with the maximum licenced emission rates (pollutant mass per unit volume of emitted stack gas) set out in the Waste Incineration Directive to obtain the individual pollutant emission rates (mass per unit time) employed in dispersion modelling. Consequently, the EIS does not seek to quantify the impact of the expected emissions from the facility, presenting instead the estimated maximum impact due to the highest emission rates allowed by the waste licence.

4.10 The diversification of processed waste types to include hazardous wastes would introduce more variation into the facility operating conditions, including the combustion gas volume flow rate from the stack. The associated uncertainty in pollutant emission rates reduces the reliability of the dispersion modelling results by a small amount.

4.11 The AERMOD model used to perform the atmospheric dispersion modelling presented in the EIS is widely used to estimate the air quality impacts of stack emissions arising from combustion processes. It is the regulatory atmospheric dispersion model specified by the USEPA for this type of application, and complies with the EPA Ireland's guidelines for modelling dispersion from industrial sources. AERMOD has been validated through the comparison of

model results and air quality measurements for a number of test cases that are representative of the conditions at Carranstown.

4.12 AERMOD calculates ambient air quality concentrations of pollutants resulting from emissions from elevated point sources. The accuracy of these calculations depends on the quality of input data on emissions, meteorological conditions and surrounding terrain. The model's representation of the plume is an approximation that is intended to capture the average dispersion of the plume expected under given conditions. Responding to questions at the oral hearing by Mr Herr, the Applicant described how during unstable atmospheric conditions the approximated plume shape reflects the possibility of plume grounding close to the stack. The accuracy of this approximation varies, but greatest errors are expected during calm periods.

4.13 Inaccuracies in the model results will increase if the meteorological data input to the model do not fully represent local site conditions. The use of local meteorological data collected on site can increase confidence in the model results. Although meteorological data including wind speed and direction have been collected on-site since the opening of the facility, these data were not employed in the dispersion modelling presented in the EIS, which employed meteorological data observed at Dublin Airport. However, as the facility at Carranstown is located reasonably close to Dublin Airport, and in an area of non-complex terrain, the use of Dublin Airport data is reasonable and the benefits of employing locally-obtained data are likely to be limited.

4.14 Dispersion models such as AERMOD only predict the increase in pollutant concentrations due to emissions from the source or sources considered. To obtain total ambient concentration values the increment in concentrations due to process emissions must be added to a background concentration, normally quantified using baseline monitoring results. In the EIS, background concentrations are estimated using a combination of historic air quality measurements made in the vicinity of the stack and air pollution levels observed in other rural locations in Ireland.

4.15 The air quality measurements in the vicinity of the stack were generally carried out several years ago in the course of a number of different air quality studies in support of previous applications. Their spatial and temporal coverage of air quality in the vicinity of the stack is poor. The Applicant has not supplemented this data by performing air quality monitoring in the vicinity of the facility since its opening. Air quality measurements obtained elsewhere in Ireland have limited relevance in Carranstown due to the presence of the Platin facility nearby.

4.16 The absence of a comprehensive air quality survey conducted in the vicinity of the stack means that the EIS does not establish the current standard of air quality in the area accurately. In the EIS, this deficiency is addressed by employing background concentrations considered by the Applicant to be conservatively high. This approach assists with the later interpretation of the predicted ambient pollutant concentrations, but it does not improve the reliability of the assessment itself. However, the associated uncertainty in the existing concentrations of air pollutants is not significant in the context of the relatively small predicted increments in concentrations discussed in the following paragraph of this report, below. A more rigorous background concentration assessment based on a recent and detailed baseline survey would be necessary in the event that greater increases in waste processing capacity and stack emissions were proposed.

4.17 The proposed changes in waste processing conditions at the facility would have a relatively small effect on the expected pollutant stack emission rates. In line with predictions made in the previous EISs for this facility, the AERMOD results presented in the current EIS show that emissions from the facility would continue to have only a small impact on ambient air pollution concentrations in the vicinity of the stack. The EIS presents a number of different sets of results based on different estimates of the maximum and average volume rates of polluted air discharged through that stack, but the differences between these are small.

4.18 The dispersion model results predict that at the proposed waste processing rate of 220,000 tonnes pa, process emissions will cause the annual average NO_2 concentration to increase by approximately 1 $\mu g/m^3$ at the worst-case location, compared to a limit value of 40$\mu g/m^3$. When the assumed background concentration of 20$\mu g/m^3$ is included, the expected ambient concentration remains well below the limit value. Similarly, the 99.8th percentile hourly NO_2 concentration will increase by only 19$\mu g/m^3$ at the worst-case location, compared to a limit value of 200$\mu g/m^3$. When the assumed background concentration of 40$\mu g/m^3$ is included, the predicted total ambient concentration is well below the limit value.

4.19 Other pollutants are more completely removed from the combustion gases by the flue gas treatment system, and consequently their impact on the surrounding environment is less than that of NO_2. For example, the predicted maximum annual average and hourly average PM_{10} and $PM_{2.5}$ concentrations due to process emissions increase by less than 1 $\mu g/m^3$ at the worst-case locations. These may be compared to limit values in the range 25-50 $\mu g/m^3$.

4.20 As previously predicted in the 2009 EIS, non-trivial increases (relative to EU limit values) in the concentrations of cadmium and arsenic are predicted to occur in the vicinity of the facility, but the proposed increase in the waste processing rate to 220,000 tonnes pa does not change these greatly. The resulting annual average ambient concentrations (including estimated existing background levels) of these pollutants are predicted to remain substantially below 50% of their limit values.

4.21 For these and all other pollutants considered, the air quality modelling results predict that total ambient concentrations during operation of the facility will remain at levels significantly below 50% of their limit values. This represents a large 'headroom', which when considered with the conservative approach taken to estimate emission rates and background concentrations, strongly indicates that the nearby atmosphere has sufficient capacity to receive the proposed additional air emissions without unacceptable environmental effects. In addition, the margin of safety between the predicted total concentrations and their corresponding limit value is sufficient to overcome any concerns about inaccuracies that may be present in the AERMOD model or the input data employed.

4.22 The EIS assesses the impact of emissions from road traffic generated by the facility. The number of vehicles travelling to and from the facility is too small to cause a noticeable effect on air quality on local roads and in local towns, and this would remain the case with the proposed changes in the facility operating conditions.

4.23 A number of presentations at the oral hearing observed that there is a persistent and frequently strong odour nuisance from the facility. The Applicant accepted the need for remediation of this problem and has proposed to introduce an activated carbon-based odour removal system to this effect. In the absence of this new equipment, the proposed 10% increase in the quantity of waste being treated is likely to exacerbate the odour nuisance.

4.24 There is also an ongoing noise nuisance that the Applicant has associated with a particular mechanical fan. Action is underway to address this problem by

requiring the supplier of the fan to repair or replace the device. If this is not done, the proposed changes to facility's operating conditions will not increase the level of noise, but the changed opening hours could extend the period of the nuisance.

5 Concluding Summary

5.1 The EIS for the proposed development at the Carranstown Waste-to-Energy facility identifies the likely environmental impacts of increasing the quantity of waste processed at the facility to 220,000 tonnes pa, and including in this quantity up to 15,000 tonnes pa of non-MSW, including hazardous waste.

5.2 The requested extension of the range of waste types permitted at the facility including hazardous wastes may require the introduction of new control procedures for receiving, inspecting, handling, and storing wastes and waste containers. Detailed information on these procedures and the equipment or infrastructure required has not been provided.

5.3 The required new procedures and facilities will depend on the nature of the different hazardous wastes being processed. As neither a definitive list of these waste types nor a detailed set of hazardous waste acceptance criteria have been provided, the impacts of the required new procedures cannot be identified. Any additional waste reception procedures should take place inside the Waste Reception Hall or equivalent type dedicated enclosed space operated under negative air pressure, to ensure that noise, odour and fugitive emission impacts are minimized. It not apparent that the logistics required for the routine handling of the now proposed expanded range of waste types, including hazardous wastes, can be reliably accommodated within the existing hall alongside the remaining anticipated volume of MSW.

5.4 The Applicant plans to avoid any additional environmental or other impacts due to the introduction of hazardous waste types by carefully limiting the non-MSW types accepted for treatment to a restricted class of suitable wastes. The selection of suitable wastes will be made by the Applicant on an ongoing basis taking into account their knowledge of the operational characteristics of the facility. The method though which this approach will be regulated has not be set out.

5.5 Potentially, bottom ash arising from the thermal treatment of hazardous waste along with MSW can itself be classified as hazardous. The Applicant intends that only suitable hazardous wastes which will not give rise to hazardous bottom ash will be treated at the facility, and that this will be confirmed by sampling and analysis of the bottom ash.

5.6 The existing flue gas treatment system at the facility has the capacity to successfully treat the combustion products arising from the thermal treatment of an additional 20,000 tonnes of waste per annum. The FGT system treats hazardous and non-hazardous wastes equally well. Stack emissions are expected to remain within permitted values.

5.7 An appropriate air quality assessment methodology was employed. The AERMOD model used is appropriate and has been recommended for the source type considered, although as with all dispersion models some degree of inaccuracy should always be expected in its results. The emissions data used in the modelling are based on the maximum emission rates allowed under the Waste Incineration Directive, and have been appropriately updated to include the proposed increase in waste capacity to 220,000 tonnes pa. Model accuracy could have been improved through the use of locally-measured wind speed and direction data and, especially, background concentrations.

5.8 The air quality assessment concludes that emissions from the proposed facility, even at maximum operation, will not lead to exceedences of air quality limit values. This conclusion is appropriate based on the results presented in the EIS. The margin between the predicted concentrations and the limit values is large and any inaccuracies resulting from inadequacies in the input meteorological data and background concentrations are not likely to materially affect the above conclusion.

5.9 There are ongoing odour and noise nuisances at the facility. Current plans to address these problems should be completed.

Professor Brian Broderick

November 22nd, 2012