

STRATEGIC INFRASTRUCTURE DEVELOPMENT
APPLICATION TO AN BORD PLEANÁLA
(REG NO. PL04.PA0045)

ORAL HEARING

RINGASKIDDY RESOURCE RECOVERY CENTRE,
RINGASKIDDY, COUNTY CORK

WITNESS STATEMENT OF DR. FERGAL CALLAGHAN BSc PhD MRSC
AMIChemE MCIWM

DIOXIN RISK ASSESSMENT

1. Qualifications and Experience

I hold a 2.1 honours degree of Bachelor of Science in Chemistry (1991) from the University of Limerick, where I majored in Environmental Chemistry and a Ph.D. in Chemical Engineering from the University of Birmingham (1998), where I specialised in the chemistry and degradation of waste materials. I am a Member of the UK Dioxin Network, a Member of the Royal Society of Chemistry (MRSC), a Member of the Chartered Institute of Waste Management (CIWM), an associate member of the Institute of Chemical Engineers (AMIChemE), a member of the IChemE Environmental Protection Subject Group (EPSG), a member of the IChemE Loss Prevention and Safety Group. It is a requirement of membership of these organisations that I am active in the field of professional chemistry and environmental assessment and satisfy their requirements with regard to level of qualifications and experience. I also lecture as a guest lecturer at Trinity College Dublin in Environmental Engineering and at Queens University Belfast in the Chemical Engineering Department.

My recent experience in projects of this nature includes:

- Ringaskiddy Waste to Energy An Bord Pleanala Oral Hearing (dioxin intake model and ecological risk assessment (2009)
- College Proteins Waste to Energy An Bord Pleanala Oral Hearing (dioxin intake model and ecological risk assessment) (2008)
- Poolbeg Waste to Energy Plant, EPA, Oral Hearing (dioxin intake model and ecological risk assessment)(2008)
- Poolbeg Waste to Energy Plant, An Bord Pleanala, Oral Hearing, (2007)
- Carranstown Waste-to-Energy Plant An Bord Pleanala and EPA Oral Hearing (2007)
- Ringaskiddy Waste-to-Energy Plant Waste Licence & Oral Hearing (2005)
- Carranstown Waste-to-Energy Plant Waste Licence & Oral Hearing (2005)
- MBM Waste-to-Energy Plant EIS (2003)
- Courtlough Waste-to-Energy Plant EIS (2002)

AWN are a multi-disciplinary consultancy who specialise in air quality, noise and vibration, soils, water, waste and risk assessment. I am currently Director with responsibility for Dioxin Assessment with AWN Consulting

2. Role in the Project

AWN were retained to provide a number of inputs to the EIS for the proposed facility. I was responsible for preparing the baseline dioxin assessment and for preparing the dioxin intake model.

AWN also retained to undertake a study of the background sediment dioxin and to conduct an ecological risk assessment of the impact of the dioxin emissions from proposed development.

2.1 Conclusion of Dioxin Assessments

The conclusions of the assessments can be summarised as follows:

Dioxin – Baseline soils and sediment

I was responsible for preparing the baseline dioxin assessment and for preparing the dioxin intake model.

I conducted the following phases of assessment as part of AWN's scope of works including:

- Baseline Dioxin Survey (2015)
- A review of available baseline data
- An assessment of the impacts of the proposed development during the operational phase

Baseline Dioxin Survey

Soil and sediment sampling was conducted at 12 no. locations in the Cork Harbour Area and at EPA Iniscarra, with the aim of determining background concentrations of PCDD, PCDF and dioxin-like PCBs in the vicinity. Samples were analysed for dioxins and furans with results compared to previous data recorded by AWN (2001 and 2008) and EPA sampling in 2000. The conclusions of the sampling and analysis programme were as follows:

Background concentrations of PCDD/Fs in soil samples were found to be reduced from samples measured at similar locations in 2001 and 2008. The concentration at Martello Tower (Location 3A) continues to be elevated above locations and in this recent round, the total PCDD/F concentration at Roche's Point Lighthouse (Location 7A) was found to be highest with a TEQ of 0.802 ng/kg. Dioxin-like PCB concentrations were typically similar to recorded concentrations in 2008 and remain well below Dutch limit value concentrations.

TEQ PCDD/F concentrations in beach sediment samples were shown to be slightly higher at three out of the four sampling locations in 2015 with the most elevated concentration (0.485 ng/kg) recorded at the strand in Whitegate Village to the east of the site (Beach 1A). PCDD/F

concentrations in sediments were still well below EA UK limit values.

Dioxin – Intake Assessment

Soil sampling and ambient air monitoring data, was used to establish a baseline for PCDD/F (hereafter referred to as 'dioxins and furans') intake for a theoretical Maximum At Risk Individual (MARI) in the vicinity of the proposed Ringaskiddy Waste to Energy plant.

The MARI was assumed to live at the point of maximum dioxin and furan deposition from the proposed development and to be a subsistence farmer, who obtained all their meat, milk and vegetables from a 100m diameter site, upon which the maximum deposition flux impacted.

The annual average dioxin and furan emissions under maximum operating conditions (worst case emissions) and assuming that both municipal solid waste and hazardous waste facilities were operating at maximum permitted dioxin concentration in the flue gas, maximum permitted flue gas exhaust flow rates and maximum throughput, were used to model soil PCDD/F concentrations over the operating life of the facility.

This was a very conservative assumption as it assumed the plant operated 24 hours per day, 365 days per year at the maximum emission concentration and flue gas flow rate.

The modelled soil and air values were then added to the baseline value for dioxin and furans and input to the RISC HUMAN Model.

The predicted increase in dioxin and furan intake for the MARI was determined to be only 2.2% of the EC TWI of 14 pg WHO-TEQ /kg body weight. The TWI was set by the EU in order to protect human health and was based on applying a safety factor to the LOAEL (Lowest Observed Abnormal Effect Levels) for dioxin and furans.

It was therefore concluded that the proposed municipal solid waste and hazardous waste-to-energy facilities will have no significant impact on dioxin and furan intake for even the theoretical MARI and that, with respect to dioxin and furan intake, the facility will have no impact on human health.

Dioxin – Ecological Impact

The baseline dioxin concentration and location chosen was Sample Location S04 (strand in front of Whitegate Village), due to this location having the highest organic carbon content and therefore having the greatest potential to accumulate dioxin.

Baseline bird egg and fish dioxin concentration was determined using the equations defined in: Framework for the Application of the Toxic Equivalency Methodology, Polychlorinated Dioxins, Furans and BiPhenyls in Ecological Risk Assessment, US EPA 2003.

The modelled increase in sediment was undertaken using predicted dioxin deposition data from air dispersion modelling conducted by AWN.

The predicted increase for a fish eating bird is a 6% increase in egg dioxin concentration, still well below the 50,000 pg/g value described above.

As previously discussed, no direct limit exists for an otter exposed to forage fish, however the predicted increase is a 12% increase in exposure from forage fish dioxin over the lifetime of the facility, and given that this is for an unrealistically conservative assumption, with respect to deposition, it can be assumed that the increase is not significant.

3.0 Submissions and Responses

In preparing this witness statement, I have considered each of the observations submitted to An Bord Pleanála by various parties in relation dioxins and the Ringaskiddy Resource Recovery Centre. I have addressed each of them below.

Vera O Driscoll and Kaye O Neill

“The US EPA has said that dioxins are the most deadly substances known to man and that there are no safe limits”

Response

The EU recognises the risks associated with dioxin and has set intake limit values accordingly. Dioxins are present in the environment all around us as a result of all combustion processes and the proposed development will not cause any significant increase in dioxin concentrations.

Dioxins are present in the environment as a consequence of combustion processes, for example:

Combustion of clean wood in a domestic stove or fireplace generates 1500 ng I-TEQ of dioxin/tonne of wood burnt (Inventory of Dioxin Emissions to Air, Land and Water, Irish EPA).

Dioxin emissions per tonne of unleaded petrol used in a motor vehicle are 2200 ng I-TEQ/tonne of fuel used (1.7 ng/litre) (source EU Dioxin Inventory Section 07, 2000).

Dioxin emissions from domestic peat burning are estimated at 16000 ng I-TEQ/tonne of peat burned (Inventory of Dioxin Emissions to Air, Land and Water, Irish EPA).

The key issue is not whether dioxins are released or not, it is whether the release of dioxins leads to a breach of EU dioxin intake limit values which have been designed to protect human health.

The EC TWI acknowledges this issue by setting a tolerable weekly intake limit value for dioxin intake. This limit was set by an expert panel of EU scientists and represents a very conservative approach to dioxin limits.

The Food Safety Authority Report FSAI 2003 Report on Waste Incineration and Possible Contamination of the Food Supply with Dioxins states:

“the FSAI considers that incineration facilities, if properly managed, will not contribute to dioxin levels in the food supply to any significant extent”.

Mr Pat McCarthy

“dioxins that can build up in the food chain”

Response

The modelling undertaken for the proposed facility demonstrates that even for the theoretical MARI (theoretical most at risk individual), who would spend their entire lives at the point of maximum dioxin deposition, there is no significant risk associated with dioxin emissions, as the predicted dioxin dose is well below the EU TWI (Tolerable Weekly Intake) limit value. This limit value is defined by the EU as being an EU TWI value of 14 pg WHO-TEQ/kg body weight/wk (from Opinion of the Scientific Committee on the Risk Assessment of Dioxins and Dioxin-like PCBs in Food 22/11/2000 (SCF/CS/CNTMDIOXIN/ 8 Final).

The predicted impact of the proposed facility is an increase of only some 2% of the limit value, from a baseline of 2.02 pg/kg bw/wk to 2.26 pg/kg bw/wk.

Ballymore Community Association Ltd

“Incinerators account for 70% of all dioxins”.

I would like to address the “70% of all dioxins” statement as follows:

Contrary to the myth that incinerators are responsible for 70% of all dioxins, Figure A below shows the Irish EPA estimated dioxin emissions for Ireland for the year 2002, as shown in (Inventory of Dioxin Emissions to Air, Land and Water, Irish EPA)

Figure B shows projected dioxin emissions for 2010, and shows that projected dioxin emissions for waste to energy plants for 2010 were predicted to be just 1.8% of total emissions, assuming a maximum of 1.5 million tonnes of installed MSW incineration capacity.

Uncontrolled emissions were projected to account for 84% of total emissions.

Uncontrolled emissions include: forest fires, grassland and bog fires, and agricultural residue burning in the field, accidental house and factory fires, vehicle fires and uncontrolled domestic waste burning.

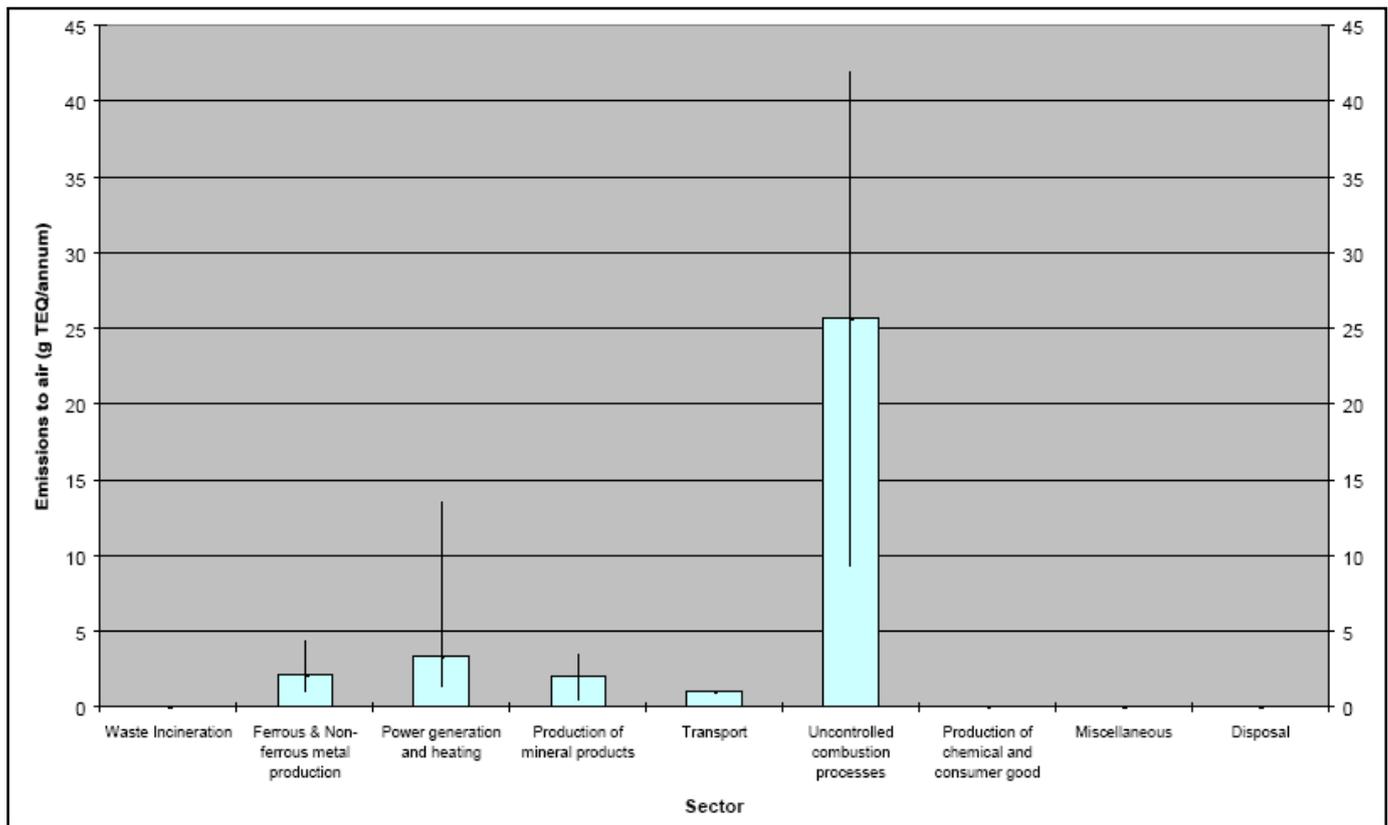


Figure A Dioxin emissions for Ireland in 2002

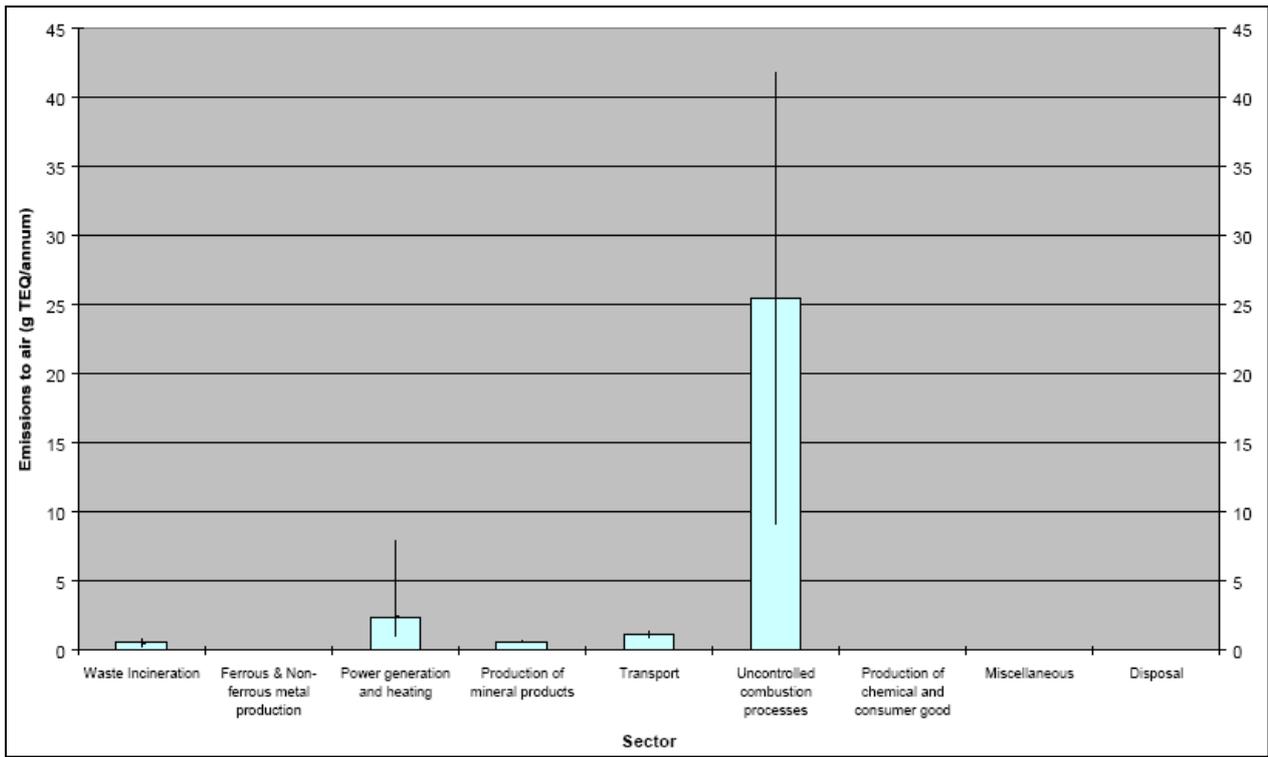


Figure B Projected Dioxin Emissions for Ireland for 2010 of 1.5 million tonnes of waste to energy capacity was installed.

Cork Environmental Alliance

Concerns expressed were: "There is no safe level of dioxin" "most at risk individual is a child not an adult"

With regard to the no safe level, contrary to the statement made by Cork Environmental Alliance, the EU has set a TWI (Tolerable Weekly Intake) value, this value has been set by an expert panel appointed by the EU.

With regard to the MARI being a child, not an adult, there are two points of note. Firstly, the TWI is set to take into account the most sensitive individuals, including children and also notes that dioxin dose is set based on a lifetime dose. Secondly it should be noted that the MARI includes for the person in question spending 6 years as a child and 70 years as an adult in the same location, so in fact the child and adult exposure scenarios have been considered.

4. Conclusion

Accordingly, I am of the view that the potential impacts of the proposed Indaver Ringaskiddy Resource Recovery Centre in terms of dioxin emissions will be insignificant.