Obj (14) 186-1

ENVIRONMENTAL PROTECTION AGENCY WASTE LICENSING RECEIVED
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INITIALS.....

ENVIRONMENTAL PROTECTION AGENCY
22 NOV 2004

C H A S E

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CHASE
BENREOCH,
SPY HILL,
COBH,

Cork Harbour Area
for a Safe Environment

Objection to the proposed determination by the Environmental Protection Agency to grant licence 186-1, in favour of Indaver Ireland.

Dear Sir/Madam,

Please find enclosed our submission to the Draft Waste Licence Application 186-1, that is open to public consultation.
Accompanying this cover letter are the following documents;

1. Appeal on behalf of CHASE to the Draft Waste Licence.
2. Our comments on Article 12 Compliance
3. Our comments on Article 13 and 14 Compliance
4. Appeal by our legal adviser on behalf of CHASE
5. Appeal by Peter North to form part of the appeal being lodged by CHASE.

Appendix;
Photocopy of letter from Director General of the E.P.A.
Photocopy of article relating to the above..
Summary of HRB report.
Photocopy of article on same.
EPA document quoted in submission.
Presentation by Dr.David Santillo, to An Bord Pleanala Oral Hearing Ref. PL04 131196.
Presentation by Dr. Vivien Howard to the Oral Hearing ref. PL04 131196
Presentation by Mr. Martin Key to the Oral Hearing ref. PL04 131196
Cheque for the amount of 253.95 Euro, to cover cost of submission and a request for an Oral Hearing.

An Bord Pleanala Inspectors Report PL04 131196.
Presentation by Dr Gavin Ter Tasscher

Thanking You
Mary O'Leary.
Mary O' Leary,
Chairperson,
C.H.A.S.E.

Objection to the proposed determination by the Environmental Protection Agency to grant licence 186-1, in favour of Indaver Ireland.

1 Introduction

1.1 This appeal is made by the Cork Harbour Alliance for a Safe Environment (CHASE) against the proposed decision of the EPA to grant a waste licence for a waste management facility including a hazardous and non-hazardous waste incinerator at Ringaskiddy County Cork, Ireland. This submission should be read in conjunction with a separate submission made on our behalf by solicitors Noonan Linehan Carroll Coffey.

1.2 CHASE seek to appeal against the grant of the licence by the Environmental Protection Agency on the following grounds:

- **Decision and Reason for Decision.** The Agency has failed to give adequate or proper consideration to:
  - The application and its supporting documentation or to
  - The submissions received from other parties;
  - The natural propensity of the site to inundation, from time to time, by marine floodwater and potential for marine pollution arising there from.
- **Conditions.** The conditions imposed on the proposed licence:
  - Are inadequate and inappropriate to regulate and control the operation of the incinerator and waste management facility;
  - Require the applicant to include unreasonable modifications to the design of the facility

2 Conditions

Conditions 1 – Scope

2.1 Paragraph 1.7 of this condition should be modified as follows:

> *"No part of the facility to which this licence relates shall be permitted to operate unless and until such time as the Agency has issued its written approval in respect of every* plan, programme, proposal *or detail referred to in the these conditions. Each plan, programme or proposal referred to in these conditions shall be* submitted to the Agency for its *written* agreement pursuant to any condition of this licence *and* shall include a proposed timescale for its implementation. The Agency may *refuse to issue it's written approval,* modify or alter any such plan, programme, proposal *or detail* in so far as it considers *such action appropriate* and shall notify the licensee in writing accordingly. Every such plan, programme or proposal shall be carried out within the timescale fixed by the Agency but shall not be undertaken without the agreement of the Agency. Every such plan, programme or proposal agreed by the Agency shall be covered by the conditions of this licence."

2.2 Unless this condition is modified in the manner proposed the Agency will not retain appropriate control over the operation of the facility in the event of the applicant failing to make an adequate submission of material as required by the conditions. Many of the conditions as drafted in the licence simply require the applicant to "submit" information. There is no requirement on the Agency to "approve" the submission before the operation of the facility commences. In the event that the detail submitted by the applicants is not satisfactory then there is nothing in the terms of many of the conditions to prevent the

operation of the facility. The proposed modification will ensure that the facility will not operate unless and until the Agency have approved all the detail material required in these conditions.

2.3 In addition to the condition as stated in the proposed licence, for the avoidance of uncertainty, paragraph 1.3 of the condition should be modified as follows:

> "This licence is for the purposes of waste licensing under the Waste Management Acts, 1996 to 2003 only and nothing in this licence shall be construed as negating the licensee's statutory obligations or requirements under any other enactments or regulations. *In particular, the licensee shall ensure that any permission or consent required under the Planning and Development Acts in respect of infrastructure or modifications to infrastructure required by this licence is obtained before site works commence."*

2.4 Paragraph 1.4 permits a tonnage of 215,260. This exceeds the tonnage of the plant specified in the original application for planning permission of 100,000 tonnes for Phase I and 100,000 tonnes for Phase II. It is not satisfactory that the agency change the tonnage without adequate reason.

2.5 With regard to paragraph 1.9 Indaver Ireland changed the nature of the wastes they intend to burn/process by increasing the list of hazardous wastes from the original licence application. This must therefore constitute a material change under the following headings:

The nature or quantity of the emissions;

The fuels, raw materials, intermediate products or wastes generated.

2.6 The nature of the licence applied for has therefore changed. This must make this application for a waste licence null and void as they gave misleading information in the original application on which the public were unable to comment.

Condition 2 – Management of the Facility

2.7 This condition should be modified so that the operation of the facility shall not be allowed unless and until the written approval of the Agency has been issued in respect of the personnel, management structure and systems referred to.

2.8 Unless this condition is modified in the manner proposed the Agency will not retain appropriate control over the operation of the facility in the event of the applicant failing to appoint appropriately qualified personnel or make an adequate provision for management structure and systems as required by the condition. The proposed modification will ensure that the facility will not operate unless and until the Agency have approved all personnel and other detail material required in this condition.

2.9 In the licence the EPA does not specify what a suitable qualified and experienced installation manager is. This must surely make a mockery of the entire application as no criteria are set down. The licensee can employ whom ever they like and say they are qualified. This is exactly the situation we have here. The newly appointed manager for the Ringaskiddy project has no experience of incinerators, has never worked in one or has never run a major or minor project to date worth considering. Furthermore, Indaver Ireland has no personnel who have ever worked on an incinerator, and we were informed that the plant would be monitored from Belgium. (Oral Hearing, 2003, J Ahern, Managing Director). This is

extremely worrying. It would appear that the EPA has no criteria for evaluating the credentials of a person in such a responsible position.

2.10 Considering the manager should be "qualified on the basis of education, training and experience", we contest that the project manager fails on two out of the three criteria and is therefore not a suitable candidate.

2.11 Taking the licensee's word that their personnel are suitably qualified is not good enough. It is the responsibility of the EPA that any facility licensed by them should pose no threat environmentally to the public or their health. To licence such a facility under the management being offered by the licensee is a derogation of the responsibility of the competent authority, the EPA. We, the public, are not happy and will not accept such a decision.

2.12 The corrective actions if the licence does not fulfil its licence conditions are not specified. Again this gives the public no comfort as the corrective actions decided upon at a later stage by the EPA could be so ineffective that the licensee might continue to breach their licence. Fines at present are so meagre it is often cheaper for the licensee to continue to offend than to rectify the reasons for the breach.

Condition 3 – Infrastructure and Operation

2.13 This condition is unreasonable as it vastly exceeds the scope of the planning permission granted for the facility which itself is the matter of an application for Judicial Review. In particular paragraph 3.1 appears to require "all infrastructure referred to in the licence application and in this licence" to be established prior to the commencement of the licensed activities. The licence application includes the provision of a second incinerator for municipal waste and the plant has not been the subject of an application under the Planning & Development Acts. Amongst the many objections that can be levelled against this second plant is the fact that it would be contrary to the approved Waste Management Plan for Cork which does not include any provision for the thermal treatment of municipal waste. The condition in the draft licence would appear to convey exempted development rights under Article 7 of the Planning & Development Regulations 2001 in respect of this second plant and its inclusion within the licence threatens to subvert the democratic planning process in this case.

2.14 Paragraph 3.1 of this condition should be modified to exclude the second plant from this licence. In addition, consequential amendments should also be made to conditions regulating the maximum tonnage acceptable at the facility (condition 1, paragraph1.4) and the emissions permitted from the facility to take account of the sole plant that has been the subject of the planning process. Failure to address this aspect of the licence could allow for the possibility of the safe emissions level for both plants being applied allowing for a lower overall standard of emissions from that single plant that has been the subject of a planning application.

2.15 This condition should be further modified so that the operation of the facility shall not be allowed unless and until the written approval of the Agency has been issued in respect of the details of the infrastructure and operation of the facility referred to.

2.16 Unless this condition is modified in the manner proposed the Agency will not retain appropriate control over the operation of the facility in the event of the applicant failing to provide appropriate infrastructure and operations as required by the condition. The proposed modification will ensure that the facility will not operate unless and until the Agency have approved all detail material required in this condition.

2.17 With regard to paragraph 3.2.5, the baseline information on which this application was assessed was derived by monitoring weather conditions at Cork airport, a location that is several miles from Cork Harbour, especially from the site in question. The airport is at a much higher elevation and in a quite

different topographical situation and is not relevant to this application. (Ref: Oral Hearing Proceedings (PL on 131196). On the calmest day of the year there is a wind blowing at the airport due to its altitude. The site in Ringaskiddy is almost at sea level, in a sheltered valley surrounded by hills. It suffers from temperature inversions frequently in the winter with many days of very still air. This is not acceptable as a basis for assessing the probable dispersal of emissions from the stack. Likewise, if the EPA are serious about protecting the environment and minimising the effects of such facilities on the populations that live therein, they should insist on monitoring meteorological stations at all the sites outlined in Conditions 5 - Emissions.

2.18 In paragraph 3.5, regarding waste inspection and quarantine areas, no size or volumes are specified for such areas. The condition should specify that this area is to be bunded, or in the form of sealed tanks rather than open aprons to avoid risks of accidental pollution.

2.19 With regard to paragraph 3.7, 110% of the largest tank is not sufficient nor is 25% of the total volume to be stored in the area. What happens to the other 73% in the event of an explosion or some such catastrophe where several tanks could rupture? It is the responsibility of the competent authority to ensure that there is not potential for environmental pollution from this activity. During the recent flooding of the site, those areas were flooded and there is therefore every possibility of contaminants getting into the harbour in such flood conditions. The EPA must be aware of the WHO guidelines for Site Selection. One of the criteria of those guidelines is that the site is not prone to flooding. These issues were discussed at the oral hearing in 2003 (PL 04 131196). The site clearly fails on this criterion. For a competent authority to proceed to issue a licence in the knowledge that there is an environmental/safety threat would be highly irresponsible.

2.20 In paragraph 3.10.4 there are no details as to how or where these sludges, which will be contaminated and hazardous, will be safely disposed of. The EPA cannot accept this, as it is their duty to have detailed information on such activities. The treatment and disposal of such was part of a question put to Indaver by the EPA, when they sought additional information and to which the applicants failed to answer.

2.21 In paragraph 3.10.6.with regard to fire-fighting arrangements, based on the evidence heard at the Oral Hearing 2003 (PL 04 131196) there is only approximately two hours of fire-fighting water available in the storage tanks, based on information supplied by Indaver in their E.I.S. In the event of a major fire it was made clear that there would not be sufficient water to bring a fire under control. (Ref: Evidence, Chief Fire Officer – Inspector's Report, Oral Hearing PL 04 131196). This poses a serious threat to public safety, considering the proximity of the new Maritime College with approximately 1000 staff and students, the employees of the Naval Base and the inhabitants of Ringaskiddy and Cobh, which is approximately one mile across the harbour and directly in the line of any plume from the site with a S.W. wind – the prevailing wind in the harbour.

2.22 With regard to paragraph 3.14, the company cannot fulfil this condition, they do not know the calorific value of pollutants as the characterization of the wastes is not known.

2.23

Condition 5 – Emissions

2.24 Paragraph 5.1 is considered an amazing statement from a "competent authority" responsible for the protection of the environment. Fugitive emissions from the tank farm are of serious consequence considering the number of drums to be stored in situ. There is no discussion as to how the licencee intends to prevent such emissions escaping into the environment. The tank farm is located directly

opposite the entrance to the Maritime College – posing a direct threat to this population in particular. The building is provided with extraction and abatement according to the licensee. Does the abatement mean that there is some way of trapping the pollutants present as fugitive emissions? To where are these emissions being extracted? Clearly is it out into the atmosphere, as Indaver have not demonstrated any realistic means of preventing such emissions.

2.25 Paragraph 5.2 would be impossible to ensure during flood conditions.

2.26 In relation to condition paragraph 5.3 "The licensee shall ensure that the activities shall be carried out in a manner such that emissions do not result in significant impairment of, or significant interference with amenities or the environment beyond the facility boundary. "No provision has been specified within the terms of the licence requiring an environmental monitoring programme outside of the confines of site and in particular in the centres of population nearby. This condition should be amended to require the continuous monitoring of environmental conditions in those areas including Ringaskiddy and its environs, Cobh, Passage West, Monkstown, Crosshaven, Carrigaline, Midleton, Whitegate/Aghada, Carrigtwohill and other affected areas of population. If the agency were genuinely committed to the principle that the facility should be required to operate without causing adverse effects beyond the confines of the site as per paragraph 5.3 then external-monitoring stations would offer an empirically based method to ensure that the external environment is satisfactorily monitored and safeguarded. The items to be monitored to include noise and vibration levels, dust, smell, fumes and key air quality indicators that relate to the performance of the plant. These monitoring stations should be established prior to operation to establish local baseline standards. Once the plant is operational results of such environmental studies should be published regularly.

Condition 6 - Control and Monitoring

2.27 With regard to paragraph 6.5, the competent authority should determine the competence of the people referred to. What are the qualifications that are deemed to be necessary?

2.28 In paragraph 6.9, the condition should require the "competent authority" to calibrate the monitoring equipment

2.29 In paragraph 6.15, the competent authority should see it as their responsibility to take samples of the residues from the incineration plant and determine their toxicity. Can the EPA clarify that these residues are ash from different parts of the incineration process?

Condition 8 - Material Handling:

2.30 With regard to paragraph 8.2.3(a), Indaver is already on record (Oral Hearing 2003) stating that they will take the customers' word re the nature of waste received at the gate. This is not good enough and potentially dangerous to base the characterisation of potentially dangerous substances on an unsubstantiated customer's statement.

2.31 In paragraph 8.3, waste that contravenes the conditions of the draft licence should not be accepted.

2.32 In paragraph 8.4.,there is no quantative measurement for how much waste will be leaving the site. Surely this type of information is vital for the "competent authority" to have, otherwise how do they know how much waste is leaving for off-site disposal. Also how will they control the movement and disposal of it? We have seen far too often in the last few years' movements of large amounts of waste within Ireland and as far afield as Europe. The EPA in many instances was not familiar with what was

happening in relation to how the waste was being disposed of. This must be viewed as a serious failure on their part to ensure environmental protection by such illegal activities. Are we going to have a repeat performance in relation to the quantities of waste leaving this facility?

2.33 Paragraph 8.13 In view of the fact that the site was flooded recently, bottom ash and highly toxic gypsum stored on hardstands would have been washed into the harbour and caused serious pollution of the surrounding water. A competent authority whose responsibility is protection of the environment cannot sanction such behaviour. Such blatant poor management of toxic waste must immediately invalidate the licensee's application as it clearly shows that they are not competent and responsible in the management of such waste .

2.34 Again this shows this company are not clearly responsible and are willing to risk severe contamination of the harbour environment in the event of flooding. Highly toxic waste is to be left on hardstands to be washed into the harbour at flood time. Ground floor level in the EIS is given at 2.65m OD. Flood levels are given for this site as 2.55m OD using Malin Head Datum. (i.e. ground floor level is only 0.1m above floor level, which is unacceptable). In the October floods the flood water levels were 2.85m OD i.e. (0..2 m above floor level), which clearly shows that this site is unsuitable and no licence should be issued by the competent authority in view of this information.

Condition 9 – Accident Prevention and Emergency Response

2.35 This condition should be modified so that the operation of the facility shall not be allowed unless and until the written approval of the Agency has been issued in respect of the policies, procedures and other details of the accident and emergency proposals put forward by the applicants.

2.36 Unless this condition is modified in the manner proposed the Agency would not retain appropriate control over the operation of the facility in the event of the applicant failing to provide appropriate procedures as required by the condition. The proposed modification will ensure that the facility will not operate unless and until the Agency have approved all detail material required in this condition.

2.37 In addition, because of the serious public concern expressed during the planning procedures in relation to this aspect of the facility's operation, provision should be made within the condition requiring the Agency to consult with local community groups and general public before issuing its consent to these proposals.

2.38 At the Oral Hearing 2003 it was clearly shown that the licensee could not adequately deal with a major incident. The managing director has said many times publicly that he cannot guarantee against accidents happening. We have already discussed the fact that there is not enough water retention for fire fighting in the event of a major accident. We were taken through the scenario at the Oral Hearing of the fire fighting services not being able to access the site in an easterly wind, as the fire would be fanned in their oncoming path. In a southwesterly wind all the noxious smoke would pour over a highly densely populated area of Great Island. In the event of a major explosion the Inspector from the HSA explained that such an event would at least blow out the windows of the Maritime College, due to its proximity. The potential of such a facility having an accident, considering the licensee's lack of expertise in the incineration process and the nature of the facility itself, is enormous. Any competent authority issuing a licence to such a facility would be highly irresponsible and in severe breach of its charter and mission statement.

2.39 With regard to 'Emergencies' addressed in paragraph 9.4,where are the "appropriate facilities" referred to by the licensee and has prior agreement been reached with the operators of these facilities? In the

event of the water supply being contaminated by the activities of the facility will it be immediately shut down? If not, then, why not?

Condition 10 - Site Restriction.

2.40 The licensee has offered €12.5million as a bond to help remediate the site or carry out any or all of the activities as are outline by EPA in this section. It takes no maths genius to work out that €12.5million would go nowhere in fulfilling this condition. In addition to the above, in the event of an incident that would result in the contamination of our food chain, the licensee must be made put up a realistic bond. In Belgium in 2000 a food contamination incident cost the national economy €500million.

Condition 11 - Notifications:

2.41 In paragraph 11.1(a) & (c), in the event of an incident, especially a major incident that posed a threat to the environment or the safety of the population, there should be a 24-hour number available to the licensee.

2.42 Schedule B

2.43 We have seen in the last few weeks the case of the site flooding and the potential and almost probable guarantee of pollution and environmental damage being done to the harbour. It is imperative that a schedule should exist for these three categories, C 2.1, C 2.2. and C 2.3 to ensure control and monitoring of emissions to all waters.

2.44 Representatives of the licensee have told us in the past that the ash will be monitored frequently to allow the company to determine what elements of the ash are not toxic so that no toxic ash will go to landfill, and therefore pose an environmental threat. Given that the conditions of the licence will only allow for bi-annual sampling of these residues, where does the licensee intend to store the ash in the interim? There is no provision of any sort of ash storage to be allowed on-site. Does this mean that much of the ash going off-site will not have been sampled, therefore posing a threat to the environment? If this is the case, then the competent authority cannot allow this to happen, as they will be in breach of their charter and mission statement.

2.45 In correspondence received from the EPA it states the following:

> "The Agency is debarred in law from granting a waste licence unless it is satisfied that the activity concerned, carried out in accordance with such conditions as may be attached to a licence, will not cause environmental pollution."
>
> It is very clear from our submissions that this licence cannot be granted as clearly the activity poses a huge environmental threat, as well as posing a risk to the safety at large.

It is clear from the evidence of the Oral Hearing 2003 that the HSA did not know enough to grant a clearance letter on the building of the facility. Due to Indaver changing their characterization of waste and moving non-hazardous wastes into their proper hazardous category now questions its classification as a Tier 2 activity under the Sevesco Directive. This evidence must now be presented to the HAS for re-classification of the site under the Sevesco Directive.

It is clear that this means that the consultation distances could now be incorrect. To grant a licence to a facility that is now in doubt in respect of its threat to the public safety of the populations of Ringaskiddy, the Maritime College, the Naval Base, Cobh town and environs would 'be the height of irresponsibility and unlawful according to the EPAs own documentation.

2.46

Condition 12 – Financial Charges and Provisions

2.47 Provision should be made within this condition for the payment of a bond to a minimum value of €100 million in favour of the Agency to secure the implementation of the proposals for decommissioning set out in condition 10 in the event of the licensee being unable or unwilling to discharge their obligations in this regard. The value of the bond shall be reviewed on the renewal of this and subsequent licences. Failure to secure adequate bonds in the past has prevented appropriate decommissioning and decontamination to take place in two major industrial installations in the Cork Harbour area at Haulbowline Island and Marino Point. The bond is essential to ensure that in the event of a plant closure not only is the site made environmentally safe but that there is provision to return the site to its original state.

Miscellaneous Points
Along with our submissions to the Draft Waste Licence application, Article 12 Compliance and Article 13 & 14 Compliance Requirements we would also like to make the following points.

In a report in the Examiner 03.11.04 Dr Mary Kelly, Director General of the EPA warned that there is no system in Ireland to monitor routinely the health of people living near incinerator and waste sites. In light of this statement the competent authority, the EPA knowing that there is doubt about the effects of such facilities on human health, cannot possibly proceed with issuing a licence. In view of the fact that health of the population has been identified by the Director General of the EPA as a problem, then that self same authority must refuse this licence i.e. observe the pre-cautionary principle. Though the EPA may have a wide range of experience and expertise they have none in the area under review, i.e. incineration, which is very worrying. A report commissioned by the Minister of the Environment 2002 and carried out by the HRB identified the following issues:-

HRB Risk Assessment
"Ireland has presently insufficient resources to carry out adequate risk assessment for proposed waste management facilities. Although the skills are available, neither the personnel not the dedicated resources have been made available". Given that today, 18 November 2004, funding to the EPA has been reduced in its pre-budget estimates, it is highly unlikely that anything will be done to rectify the above situation in the near future. How then could the EPA possibly even consider licensing an incinerator when such doubt exists over its effects on health and environment. "There is an urgent need to develop the skills and resources required to undertake health and environmental risk assessments in Ireland (Ref Doc 1). How can the EPA ignore such findings which clearly indicate the need to observe the precautionary principle in the interest of public safety and health. To grant a licence is also contrary to the mission statement of the EPA which is "to protect and improve the natural environment for present and future generations."
The HRB report was in total, a fair and balanced report, but unfortunately its' findings have been ignored by the relevant authorities and indeed the Government as it does not support current Government thinking.

WHO Guidelines
If this company had employed the WHO guidelines for Site Selection of Hazardous Waste Incinerators properly, they would not have chosen this site for such a facility. From a physical perspective this site is prone to flooding, which was discussed at the Oral Hearing 2003 and witnessed first hand in October 2004.

It is also identified in a report commissioned by the EPA and completed by Dr John McSweeney, as an area in danger of coastal erosion and not recommended as an area for the building of such developments.

The ground floor level for the main building, warehouse and tank farm @ 2.65 m O.D., taken from Malin Head Data. The flood level given for the area is 2.55 m OD i.e. 0.1m below the flood height. No engineer would recommend the building of any project @ less than 0.5m above flood water, which is taken to be the highest tide in the last 100 years. During the floods in October the flood height went to 2.85m O.D. which would have all the main buildings and tank farm flooded. Furthermore, the floods of October 2004, are not taken as being a 100 year flood level, the floods in 1960s are still taken as the highest so that this site will be more deeply flooded in a 100 year event.

This totally rules out the site as being suitable for the storing or processing of hazardous wastes due to the enormous environmental threat to the harbour and its waters.

US EPA
The US EPA have declared zero tolerance on dioxin emissions and state that there is no such thing as safe levels of dioxins.

The National Hazardous Waste Management Plan identifies the need for thermal treatment. It does not specify incineration and has given no consideration to the other thermal treatments that have lower emission levels, but merely went for the first option presented to them by a private company.

Alternative Technologies
The EPAs' mission statement is:-
"to protect and improve the natural environment for present and future generations, taking into account the environmental, social and economic principles of sustainable development."
The EPA have given scant regard to that same mission statement. There are many safer, more environmentally safe technologies available today to deal with all waste streams. The EPA have not entertained these technologies in any shape or form. This is a very poor reflection of the agency's commitment to their function as a competent authority. It also shows their lack of commitment to the protection of our natural heritage. They have the opportunity to embrace newer, better, safer technologies, to be innovative in their thinking and creative in finding solutions to our waste problems. They have too easily succumbed to the pressure of big business at the expense of the environment and the health of the people of Ireland. I will remind the EPA of their professed vision – "a powerful agent for change, both in attitude to the environment and in actions on environmental protection."

EU
The EU has some advice to offer to countries who are structuring their waste management:-
"The Commission does not support incineration. We do not consider this technique is favourable to the environment or that it is necessary to ensure a stable supply of waste for promoting combustion over the long term. Such a strategy would only slow innovation. We should be promoting prevention and recycling above all. Those countries who are in the process of drafting their planning should not base it upon incineration."

National Policy
Supporting this application is contrary to some of the Governments own policies namely The National Spatial Strategy as CASP does not include incineration.
The National Hazardous Waste Management Plan whose cornerstone is "prevention" does not favour incineration and it is given that prevention cannot be promoted in the atmosphere of mass incineration especially when commercial companies are promoting incineration so aggressively.

In the interest of transparency when the objections and submissions are considered by the Technical Committee and the Board of Directors, we expect that Ms. Laura Burke will not be consulted or involved in any way in the evaluation of the evidence and the making of a final decision to include her in the process would smack of political interference of the highest order.

Again I bring you back to the vision of the EPA
as "an organization that works to place environmental issues at the heart of international, national and local decision-making process."

It would be so reassuring to those of us who have taken enormous time and trouble to submit to this draft waste licence application, to be able to believe that the EPA were committed to this vision. The recent appointment of a new director, who has worked for the last number of years in promoting incineration has hugely undermined the confidence of the community and the public at large in the EPA. It would and has totally undermined their objectivity on this entire application.

The final point we would like to focus on is the vision the EPA as "a credible and respected organization, speaking out courageously for the protection of the environment."

As someone who has an enormous respect and deeply values the environment that we are fortunate to have still in Ireland, I would like to believe that there was truth in the above statement. It is unfortunate that to date, in this entire debate, it has been the communities who have brought any sense of balance to the argument , most times against all the odds.

We have as a community been ridiculed and dismissed by the last Minister of the Environment. Our efforts as a community to question the decision of 10 Government appointees on the granting of planning permission to the licencee, was belittled and undermined by the leaking of the draft licence. Employees of the EPA saw fit to leak the information to The Irish Times before they notified those people who had exercised their democratic right and had taken the trouble to submit to the waste licence application.

In her inauguration speech recently our President said, that "economic success is not a destination in itself." We too as a community recognize this and what we are looking for is a balance, economic prosperity, but not at any cost. President McAleese went on to state that the "cushion of consumerism is no comfort for communities and acknowledged that the "nations great heartland" is its communities.

That speech in itself has given this community renewed spirit and energy. It has further established us as a strong resilient community and it is reassuring to hear that our President sees such communities as an asset to our country.

We feel fully justified in objecting to this draft waste licence in view of all the issues raised in this submission. They are very serious issues – we ask the competent authority, the EPA, not to compound the mistakes made to date in this entire application. We ask them to have the resilience to follow their own mission statement and vision. In the interest of safety of both the public and the environment we ask the EPA to withdraw this draft licence.

We also request a moratorium on mass incineration until all the issues have been resolved. We call for the establishment of a Baseline Health Study and only then will public confidence be restored.

To discuss these issues in an open forum C.H.A.S.E asks for an oral hearing for this waste licence application.

2.48

Comments to PD 186-1 submitted without prejudice to basic submission that no licence may legitimately be issued for this development at this site at this time.

Part I – Activities Licensed

What could be meant by "evaporation, drying and calcination"? Similarly for the "recycling and reclamation of organic substances", particularly as a later condition (1.6) appears to rule out any composting or other biological transformation process – in this case, why is Class 2 included within the license at all? Class 9 ("use of any waste principally as a fuel…") seems to be an open license to burn anything, a concern which is later borne out by the interminable lists in Schedule A. Also we note that Class 8 is "incineration on land or at sea" – while this is a standard EPA classification of an activity we would advise the EPA that incineration at sea has been prohibited under the OSPAR Convention for many years.

Condition 1

1.9 (a) – what would be considered a "material change or increase" in terms of fuels, raw materials, intermediates, products and wastes used or generated at the facility? It seems that they can accept such a diversity of wastes anyway given that significant material changes in fuels for a start would be taking place every day. Just how much of a change will they have to obtain prior agreement for? The schedules themselves are so open to interpretation that this condition will probably never apply, even though the day to day running of the facility may involve numerous and substantial material changes.

Condition 2.

2.3.2 – the inclusion of obligations for waste minimisation and setting of waste reduction targets is nugatory taking in to account what the facility will be doing in practice.

2.3.7 – should there not also be an obligation to provide on request information about the types and quantities of wastes received, stored and dispatched by the site, as well as the final fate of any wastes leaving the site again?

Condition 3

3.14.4 – how will effective control be exercised over these input limits for chlorine etc.? Since dioxins have to be monitored in stack gases only quarterly and in ashes there are no limits at all, how can we be confident that these input controls will be adhered to? In fact, once they start receiving mixtures of all kinds of wastes, how will the company itself ensure that these limits are not exceeded?

3.2.4 – this establishes that groundwater quality will need to be monitored but does not lay down any conditions that the groundwater needs to be fully protected from the potential for contamination from the site

3.6.2 – negative pressure in the reception hall for the incinerator, but does this not go for the transfer facility and other storage areas as well? What efforts will be made to monitor and control fugitive emissions of odours (and volatile chemicals in general) and dusts which can arise in storage and handling areas? Negative pressure is one thing, but where will all the vapours ultimately go?

3.9.2 – use as process water as far as practicable – what does this mean? And what will they do with it when use as process water is for some reason not practicable? How often is this likely to occur?

3.9.3 – this seems to be a major flaw in the conditions and schedules – there is currently practically nothing in writing about how they should monitor and control discharges and run-off to surface water and sewers. These sections of Schedule C are simply empty. How can it be left so open if this is a license for operation of the facility? All it states at present is the need to comply with "any agreed trigger levels" – why are there no standard/default values and why, in any case, are there no agreed conditions for this facility? Given that it is located very close to the sea, it is likely that any run-off will rapidly become a marine contamination issue.

3.9.4 – why are the surface water monitoring trigger levels required limited only to the crude parameters of pH and TOC? This is unlikely to detect anything but the most severe spills or releases of chemicals, when a problem should be evident anyway. If this is all they will do for surface water monitoring, they may as well no bother. Some attempt to look specifically for the presence of some of the bulk chemicals they will be handling on site would be essential if this is to be effective and meaningful monitoring.

3.10.2 – should the quantity of absorbent material available not be equivalent to the bund requirement? In other words, shouldn't the company be required to keep on site sufficient absorbent material/containment booms to deal with 110% of the capacity of the largest tank/drum or 25% of total volume of substances stored (whichever is the larger)?

3.10.4 – sludge and drainage should be collected for safe disposal where?

3.14.8 – these permitted values for TOC and loss on ignition are drawn from the EU incineration directive but are much higher than can be achieved with state of the art incinerators[1]. 3% TOC in bottom ash and slag can hide a diversity of organic contaminants, especially as there appear to be no specific limits set for any such compounds in ash in the schedule.

Condition 8

[1] *E.g.* Rubli S, Belevi H, Baccini P Optimizing municipal solid waste combustion through organic and elemental carbon as indicators. *Environmental Science & Technology* 37 (5): 1025-1030

Schedule C.6.1

This biannual requirement is totally inadequate. Even for inert landfill sites in UK (i.e. those receiving nothing but uncontaminated topsoil) there is a requirement to monitor every month or two months at least. In the case of the Indaver facility, monitoring should probably be even more regular. Contaminants can spread a long way in groundwater over a period of 6 months and many of the wastes they will be handling, especially chlorinated solvents, have a strong propensity to get into groundwater.

Schedules – general

As noted earlier, no monitoring programme is proposed for fugitive emissions of dusts or solvent fumes from the site, even though such emissions and losses could be substantial for this type of waste storage and handling facility.

END.

As part of our submission to Indaver Waste Licence Application (Register No. 186-1) we would like to make the following comments:

In relation to the response received by the EPA from Indaver Ireland, under Article 14(2) (b) (ii) of the Waste Management (Licensing) Regulations, Article 13, Compliance, September 2003, many of the questions asked were not answered. We outline these issues below.

2.0. Article 13. Compliance Requirements.

2.2 Waste Elimination:

Indaver did not address waste elimination either in the regional submission or in their response to the EPA questions. They talk at length about waste minimisation - this is not elimination.
They talk of gypsum as one of their waste products from flue gas cleaning. How are they going to recover it for re-use as it is contaminated with a cocktail of particulates? What hazardous waste landfill site do they propose to use for disposal and where? What are the expected quantities of waste to be produced?

The use of lime or limestone is not BAT, as is stated by Indaver. In Europe incinerators of this type use sinctered metal catalytic dioxin destruction filters., this is considered B.A.T. . The Irish EPA should not accept anything less than BAT to protect our environment, it is not up to private industry to decide what BAT is or what is best technology for Ireland? Surely this is the function of the competent authority whose mission statement is to" protect and improve the natural environment for present and future generations"?

In their choice of the single scrubber option, where have they identified that this system is not prone to failure what is the failure rate and if it fails, is there a back-up system?

They have not addressed the question of how they propose to dispose of their ash. This is very significant and it must be mandatory that the licencee shows clearly that there is a safe disposal mechanism for their ash which will represent approximately 33 % by volume, of the waste burnt in this facility. Recently at the National Waste Management summit, the audience heard of the Swedish experience where they are now looking at biological and composting methods to deal with their wastes as they have huge problems with the disposal of hazardous ash from incineration. (Christine Ludbeock).Why can we not learn from these countries who have tried incineration and are now trying to find better , more sustainable ways of dealing with their waste. Best practise is not necessarily Europe, who committed to incineration when there were few other choices. Now we have the choice to be cleverer in how we deal with our waste. We can reduce our waste by up to between 50-70 % without incineration, this we were told at the same summit by not a member of the Green Party, but by Mr. John Ahern , M.D. Indaver Ireland.!

They have not addressed the question of waste elimination in relation to the sludges that will arise from the sumps in the storage tanks. They have not addressed how they intend to deal with them or how and where they will be disposed of. These will be highly toxic and will consist of chemical cocktails of all sorts.

2.3 Background levels of Ni (Nickel) are higher than would be normal. The additional effect of Indaver Ireland's activities may well push the accepted levels above those as recommended by Council Directive 1999/30/EC. Ground level concentrations as a result of Irish Ispat activities cannot be ignored and the cumulative effect has not been addressed. 15.8 ng/m3 Ni is high for a rural area and will take many years to reduce. The additional burden on the environment of an incinerator emitting an additional load, no matter how low, is not acceptable. Considering the present background levels and lack of baseline information on the effect of industry to date on the population this licence should not be issued.

2.4. Indaver under-estimated their volumetric flow by a factor of 10X. This throws out all their estimates by a similar factor and therefore invalidates their original application. Indaver say it was a "typo error" the question is are there other such errors and they should now submit a new application with correct information.

2.5.1 So2 Source Information.
Ambient ground level concentration (G.L.Cs) of Sulphur Dioxide (So2) was predicted based upon the original projected waste characterisation. These wastes have now been revised by Indaver Ireland (Ref: 2.1. Article 12 Compliance Requirements). Therefore, the figures given in table 2.5.1 are null and void and cannot be accepted by the EPA.

2.5.3. Dispersion Model Results:
Indaver have ignored the requirement to meet So2 levels specified in EEC 99 30 EC as they, without the agreement of any official or competent organisation, have classed the location as industrial and not relevant for protection of ecosystems (i.e. fish, water, food, etc not considered important by Indaver). This is not acceptable.
The dispersion model results outlined Table 32.5.3.cannot be taken as results as they are all based on scenarios – predicted emissions – and not based on fact. They were also based on original predicted waste characterisation (ref: 2.3.1. above) and therefore are no longer acceptable.

2.6. Heat Emissions
Indaver have here again failed to answer the question asked. They have provided no impact assessment other than to say that no impact was expected. This is not acceptable as an answer.

3.0. Non-Technical Summary.
We contest that this submission along with Article 12 Compliance requirements, substantially changes the activities at the facility described in the E.I.S. Indaver have no role or function in deciding that a revision of the Non-Technical Summary is not warranted. Surely this is the responsibility of the organisation appointed to monitor the compliance and issuing of licences – i.e.the E.P.A?

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Addressee

Environmental Protection Agency,
PO Box 3000,
Johnstown Castle Estate,
Co. Wexford.

19th November 2004
Our Ref : JN/ML

Re : Reference No. PD 186-1
Application for Waste Licence by Indaver Ireland for development at Ringaskiddy, County Cork

Dear Sirs,

We act on behalf of Mary O'Leary and Others, known as CHASE, c/o Benreoch, Spy Hill, Cobh, Co. Cork. Our clients wish to object against the proposed determination issued by the EPA in this matter. Our clients have asked us to address certain legal issues arising from the application and the Agency's proposed determination. This letter is therefore to be taken together with the material being submitted simultaneously by our clients which together constitute our clients' observations and objection to the Agency.

1. Non-compliance by Agency with applicable law

The Waste Licence Application is for a project which falls within the scope of the EIA Directive 87/337/EC as amended and as implemented under Irish legislation. As such, it requires to undergo proper assessment as laid out in the Directive prior to receiving development consent. It has not undergone such assessment. We are aware from previous correspondence with the Agency that the Agency sees its function as being limited to the functions set out in Part 5 of the Waste Management Act 1996 and the Waste Management Licencing Regulations.

We are also aware from correspondence issued by the Agency showing that the Agency is aware of and implicitly supportive of the conclusions in the report published by the Health Research Board in February 2003 on the health and environmental effects of landfill and incineration of waste. That being so, two things are clear :

(a) The Agency does not see it as its task to carry out any form of Environmental Impact Assessment pursuant to the EIA Directive;

(b) The Agency is fully aware of the findings in the report as published by the HRB to the effect that Ireland does not have adequate resources to carry out a risk assessment of this project. Further adequate systems are not in place to carry out human health monitoring nor is there baseline data available on current health status.

It follows that there is no legitimate basis on which the Agency can grant a Waste Licence for this project in this location at this time.

2. Failure to consider available material

Identical observations arise when one recalls the statutory prohibition against the Agency granting a licence where to do so will result in environmental pollution. It is plainly impossible for the Agency to reach that necessary conclusion in the prevailing legal, medical and factual context.

Even within those constraints, the Agency has neglected or omitted to take all appropriate and necessary steps within its power to investigate the application to the best of its ability. The project has been the subject of consideration by An Bord Pleanala. It is clear from the material contained in the report of Inspector Philip Jones of the Board that the project is not fit to be granted any form of statutory consent such as may allow it to proceed. The Agency is well aware that the decision of An Bord Pleanala to reject its Inspector's recommendation is currently subject to challenge by way of Judicial Review. (Indeed, we note with interest that details were leaked of the EPA's proposed determination to a member of the press the day before the Judicial Review Hearing was to commence, thus ensuring press coverage of its decision on the morning of the intended hearing.) The report of the Agency's Inspector shows no evidence that any of the issues of profound concern to his counterpart at An Bord Pleanala were taken into consideration by him at all or in any meaningful way. There appears to have been no utilization of the statutory provisions of consultation between the Agency and An Bord Pleanala. The approach of the Agency appears to have been that the Application would be considered to see whether the technology proposed would be capable of meeting certain selected prevailing standards. Once the Agency decided that it could form a view that that was the case, the Agency appears to have considered itself obliged to issue the Licence. That is a fundamental misunderstanding by the Agency of its statutory responsibilities and function.

3. Mistaken reliance on Inspector's Report

The Agency made its decision having considered a memorandum dated 1st October 2004 received from its own Inspector. The report omitted material and information which was, in our submission, essential for proper assessment of the application. It contained errors and false assertions which rendered its conclusions unsafe. It entirely disregards the World Health Organisation's published guidelines which make it abundantly clear that this site is not suitable for this project. This oversight is all the more incomprehensible given that the existence of the guidelines and, indeed, one of their relevant exclusionary factors (among many others which would exclude this site entirely from further consideration) is drawn to the attention of the Agency by letter dated 3rd March 2004 from Michael Martin, T.D., Minister for Health & Children.

As the Agency admits to possessing no medical expertise and as it has not retained any person with medical expertise to assist it in preparing its proposed determination and as it, through its Director General, has acknowledged the findings of the HRB Report referred to above, the cursory dismissal of

the Minister's letter is alarming in the extreme. The response to this letter contained in the Inspector's report completely fails to address the fundamental importance of the site selection guidelines published by the WHO and then seeks to rely on computer models received from the company as if those models were conclusive on the matter. This elevation of computer models supplied by the company over the carefully considered guidelines published by the World Health Organisation exemplifies the unsatisfactory and unreliable nature of the report in making a fair and reasonable decision on the Licence Application.

A report that contains such an elementary error as claiming that the site is situated "at the north western end of the Ringaskiddy peninsula" when it is at the eastern extremity of the peninsula is patently unreliable.

The report entirely omits from its site description the presence of the National Maritime College with its seven hundred students and one hundred and twenty staff immediately across the road from the intended project. It fails to describe the existence of other areas of static population (critical for any reasonable consideration of site suitability) including the headquarters of the Irish Navy and Spike Island Prison not to mention the extensive human settlement within range of the development, the largest being Cobh. It recites without question material tending to show the Applicant in a favourable light (ISO standard holder) while omitting material showing the company in an adverse light (e.g. serious breach of operating terms at its existing operation in Belgium).

The report at page three unquestioningly accepts the Applicant's case that the maximum capacity of the incinerators will depend on calorific value and could thus allow up to 150,000 tonnes in each incinerator. That case was made by the Applicant at An Bord Pleanala and was rejected by the Board.

Section 2.5.2 discloses that the operation would (on the figures submitted by the Applicant itself) breach applicable air standards under Council Directive 1999/30/EC. Despite this, the report claims on a completely inappropriate basis that this is something that can be tolerated. At 2.3.1 of the report, significantly raised levels of nickel are described. Levels of PM_{10} are described which exceeded relevant EU limit values by up to 600%. Despite that, the proposed determination would allow further emissions of PM_{10} and nickel. The report asserts, without any basis in evidence or further investigation, that the already excessive levels must have been due to Irish Ispat Limited. (It partly relies for this conclusion on an assumption that easterly winds were blowing at the relevant time. Irish Ispat is, in fact, to the north of the Indaver site). It, therefore, complacently concludes that as Irish Ispat is no longer operating, these levels must no longer be relevant. The EPA holds itself out as possessing technical expertise. Its Inspector however here makes an enormous assumption on a critical matter with no supporting evidence. It would have been easy to require further updated baseline data. This was not done.

The failure of the EPA to deal with Irish Ispat's pollution over many years makes this section of the report particularly unacceptable. The existence of the heap of toxic dust at the Irish Ispat site where it is open to the air and free to blow in the wind makes a nonsense of the report's conclusion which is in any event devoid of any scientific basis.

The report correctly states that the decision to proceed with Phase 2 depends on an evaluation of the Waste Strategy of the Local Authority. The report does not make clear that the incinerator proposed in Phase 1 is intended to burn industrial waste only. The discretion as to whether to proceed with Phase 2 incinerator is left entirely with the Applicant. In effect, the Agency is giving permission to the Applicant to consume by way of incineration up to 300,000 tonnes of waste with no proper or adequate consideration of the necessity for that scale of operation. The decision can only be considered premature in those circumstances.

Similarly, the acceptance in the report that the Application involves a waste-to-energy operation is unreasonable and unfounded. No Planning Permission has been granted for this aspect of the development to date nor has any such application been made. This is despite the fact that the Applicants had stated in its Planning Application to the Local Authority that this component would be the subject of a separate application. Given that different considerations arise in assessing a waste-to-energy plant as against an incineration plant without energy recovery (which is considered to be mere disposal), it is improper and unreasonable for the Agency to have based its decision on this assumption.

The description in the report of the waste transfer station is unsatisfactory, incomplete and misleading. The waste transfer station is in certain aspects the most likely location for serious accidents. The cursory description of this aspect of the development does not reflect that fact. The report conveys a misleading impression of potential sources of hazard at the waste transfer station. It asserts that there would be no significant "point source emissions". That, as a simple statement of fact, is correct. However, it omits to state that there will be "non-point source emissions" of potential significance due to the design of the building and the extensive vents contained in the structure. Similarly, fugitive emissions will arise during operations outside the building which, again, are in effect disregarded.

We submit that the Agency has not complied with the applicable legislative requirements. As a result, it has breached our clients' rights under Bunreacht na hEireann as well as their rights under the European Convention on Human Rights Act 2003 and their rights under common law. In addition, it has failed to consider the Application in a manner consistent with the requirements of fair procedures and natural or constitutional justice. In particular, it has given undue credence to assertions made by the Applicant while, unreasonably and without justification, disregarding valid observations and relevant material submitted by parties opposing the Application.

For these reasons and the other reasons advanced by our clients separately and by the other interested parties in the matter opposing the Application, we invite the Agency to refuse the Application.

Yours faithfully,

Joe Noonan,
NOONAN LINEHAN CARROLL COFFEY

WASTE LICENCE REGISTER NUMBER 186-1

OBJECTION AND COMMENTS ON THE PROPOSED DECISION ON A WASTE LICENCE FOR THE INDAVER FACILITY AT RINGASKIDDY, CO CORK

ON BEHALF OF

EAST CORK FOR A SAFE ENVIRONMENT

AND

CORK HARBOUR ALLIANCE FOR A SAFE ENVIRONMENT

(CHASE)

PH North
PIDC
Nov 2004

1.0 Introduction

These comments relate to the report, presumably of a technical committee, presented by Mr Kieran O'Brien to the EPA board and to the proposed decision.

The Agency is also directed to the original submission and comments presented to the Agency in September 2004, which the aforementioned report purports to have considered and answered.

Since the Agency already has two copies of the original submission, it has not been considered necessary to attach further copies to this submission.

An oral hearing is requested in view of the number of people represented by the environmental groups, for whom this submission has been prepared, and because of the public concern over the project for which a licence is being sought.

2.0 General Comments

21 Competence of the Technical Committee:

The resources allocated to the review of the application and the technical and professional competence of the individuals responsible for this review are challenged. The original submission questioned whether the EPA had the requisite resources and whether such resources would be allocated to undertake a proper and professional review.

The response to the original submission was general and must be regarded as inadequate. It would appear, to this author, that the review has not been carried out by a suitably qualified, knowledgeable and experienced team.

Professional codes of conduct, as well as the necessity for transparency in such decisions, require that the professionals responsible for this review be named, together with their qualifications and experience. It is noted that the proposed decision should have been duly signed by all the members of the technical committee.

It is further noted that all such committee members should be made available for the oral hearing.

2.2 Underlying Documentation and Selection of Incineration:

The original submission noted that Indaver (and the EPA) relied on the support of a range of studies and reports to justify the selection of incineration as the appropriate solution to both hazardous and non-hazardous solid and liquid waste problems. In particular, both Indaver and the EPA relied upon a number of these documents to answer concerns relating to dioxins and other emissions. The submission noted that the author had serious concerns and criticisms relating to all the reports and studies.

It is first noted that the EPA technical committee did not bother to contact this author to discuss any of these concerns, which must be of far wider interest than merely this one project, nor to obtain any references for statements and evidence of rebuttal to which this author referred.

The Agency responds that a number of factors have been considered, but provides no evidence of any consideration whatsoever. The Agency fails to address any specific concerns at all.

Furthermore the Agency states that the documents referenced by Indaver do not form part of the application and questions the author's failure to detail the issues or their relationship to the determination of the licence.

This argument must be regarded as ludicrous and untenable. Indaver have employed the documents as an integral and essential part of the justification for their facility and its technologies and to support their contentions with regard to environmental impact.

In addition, a number of these documents are official EPA documents, at least one of which has been claimed to be a statutory document. The Agency itself must depend on many of these documents in its review of the Indaver application.

2.3 The Decision Process:

There are two key parts to the granting of a licence, or a proposed decision, - the process by which a decision is made and the decision itself.

I would refer the Agency to the Supreme Court Judgement (JR58/1997).

In respect of the decision-making process I must contend that the argument of unreasonableness may be applied - the Agency has flagrantly rejected or disregarded a number of fundamental arguments and has failed to apply any semblance of common sense to the process.

The decision itself must be regarded as flawed.

I would also take issue with the quality and quantity of the information supplied by Indaver and on which the decision was based.

In this argument I would note the analysis presented by the Supreme Court – though the Roche case may have been somewhat different -, primarily over the fullness of the explanations and the clarity of explanation.

And I can certainly accord with the comments regarding the requirement for the Agency to give adequate and clear reasons for its decisions and for the disregarding or overruling of objections.

It is abundantly clear that the Agency has failed to address many of the issues raised in my submission and has given no explanation or reason for this failure

3.0 COMMENTS ON THE REVIEW OF SUBMISSIONS

Reference Memo, 1/10/04 K O'Brien to EPA Board

3.1 **Incineration Plant** (p3): the nominal capacity of each incinerator is given as 100,000 tonnes per annum but the maximum capacity as 150,000 tonnes per annum. In general the application relates parameters to 100.000 tonnes per annum. Maximum capacity could thus involve a 50% increase in some of these parameters and this has not been explicitly considered.

It has already been noted in my earlier submission that incinerators are not generally permitted on calorific value but on waste mass throughput. The capacity should be restricted to 100,000 tonnes per annum for each incinerator.

3.2 **Process Description** (p4): this appears to differ from the description given by Indaver in a number of key respects. It suggests that the Agency has received further information that has not been advised to other parties.

3.3 **Proposed Determination – Air** (p7): this again differs not merely from Indaver's process descriptions (which themselves vary) but also from the description provided earlier in the memo (SNCR is now employing ammonia, whereas earlier it could be either ammonia or urea).

3.4 **Impact of Air Emissions** (p9): AQS are not levels regarded as having no health effects – rather they are levels above which remedial action must be taken. It is patently obvious from consideration of background levels and modelled concentrations that the air quality in Ringaskiddy will be significantly damaged.

The use of toluene for comparison (see TOC) is ludicrous when the principal solvent is expected to be methanol.

If this facility is permitted, it is unlikely that any further expansions or new facilities could be permitted within the Ringaskiddy area, since a number of parameters will now be at or close to the AQS/EAL.

The WHO TDI for dioxins/furans has been reduced over the years and may be expected to be further reduced. "Appreciable" is not well defined – it generally means significant or readily observed damage. It fails to take into account the impact of non-critical health deterioration on quality of life (eg. increased allergies, asthma and other bronchial damage, neural damage, etc).

3.5 **Waste** (p 13): these figures are based on 100.000 tonnes per annum for each incinerator and an estimated waste. Actual figures may be 150% to 300% of these figures – especially if lower calorific value wastes are considered.

3.6 **Submission 1:**

point 10: the response asserts no significant environmental impact. This is seriously misleading – the environment in Ringaskiddy will be significantly damaged in comparison to its present state. The possibility that it may be within an AQS, which covers major urban and industrial complexes, is a different and secondary matter.

3.7 **Submission 3:**

This must be one of the most callous and disgraceful interpretations of the rules that the Agency has perpetrated.

It would be entirely reasonable to expect the Agency to have a copy of the transcript of the Oral Hearing and, if not, that it could and should obtain one from An Bord Pleneala. The transcript is a public document and An Bord Pleneala a State Agency.

3.8 **Submission 6:**

points 3 to 5: thermal inversions are common in the Cork Harbour area, though data on the incidence may not be available.

The "precautionary principle", espoused by the Agency, is applicable to this point. The Agency and Indaver have not provided, nor can they provide, specific data for the site to show that inversions are not common. Furthermore, Indaver has not validated any of the models employed by reference to historical data available for the Cork Harbour area.

If inversions are more frequent than has been assumed, then the predictions of pollutant concentrations may turn out to have been seriously underestimated.

It is suggested that the EPA and the Meteorological Service should establish immediately a programme to determine the frequency of inversions throughout the harbour area. Furthermore, there would be no harm in running simulations on the CALPUFF model, which can be accomplished quite quickly, using various meteorological scenarios and repeated as data becomes available from the EPA/Meteorological Service study.

3.9 **Submission 7:**

3.9.1 **Submission:** the original submission should be considered by the Agency to have been re-submitted as part of these comments, since it has largely been ignored.

3.9.2 **Cover letter:** the Agency was directed to consider concerns regarding false or misleading information – but has clearly not done so. Instances were provided in the main part of the submission.

It is not the responsibility of a third party (this author) to assess such matters, but rather it is the responsibility of the Agency – and to take action where appropriate. It is now assumed that the Agency has no intention of pursuing any action. The Agency should consider the implications of a third party succeeding in a private action on this matter.

Furthermore, any such action would not only involve the applicant, Indaver, but its principal agent, representative and officer involved in the application – who is now an EPA director. The conflict of interest, in allowing the EPA to determine whether or not to pursue an action against one of its own directors, is obvious – hence the suggestion to refer the matter, in the public interest and in the interest of the EPA, to another Agency or body.

With regard to site management, it must be pointed out that the Indaver information was out of date before the PD was issued. Furthermore, neither Indaver nor the Agency provide sufficient definition of qualifications or experience for any position

and there is no acceptable test or method of assessment for competency. The subject of personnel assessment is now considered to be a major concern and has been the subject of a number of EU studies, papers and guidelines. The Agency appears to be somewhat backward in this area.

3.9.3 **Scope and Complexity:**

The response to this section is totally inadequate.

The Agency has not demonstrated that it has considered at all, let alone properly, the appropriateness of mass burn, mixed waste incineration; the necessity of this technology to the multitude of wastes proposed; alternative technologies including alternative thermal technologies; the trends in hazardous waste generation, composition and treatment; etc.

The Agency has also not demonstrated that it has fully or properly considered the design, construction, commissioning or operation of this facility.

The Agency made no effort to contact this author to discuss any of the concerns or issues. It would appear that the Agency has accepted everything from Indaver without even a cursory check or evaluation and has summarily dismissed or ignored any opposing comments – even where these clearly challenge specific, verifiable statements of Indaver.

The Agency, however, has entered into discussion with Indaver and has requested clarifications and additional data.

3.9.4 **EPA**

The Agency has not demonstrated that it has, or has employed, the resources and technical competence required.

The Agency has ignored all comments, relating to its broader responsibilities, under which it prepared (for example) the National Hazardous Waste Management Plan, and has not demonstrated that it has considered the Indaver facility within the broader context.

3.9.5 **EU and National Policy:**

The Agency has ignored all comments relating to trans-frontier shipments, the proximity principle, waste solvents and the Agency's own Strategy Study.

The statement that the Agency has assessed the licence with regard to relevant environmental management plans, directives and regulations is inadequate and does not appear to accord with the principles expressed in the Supreme Court judgement noted earlier.

The Agency thus appears to have abrogated all its responsibilities except the relatively narrow one relating to licensing. Even then, it seems only concerned with the specifics of emissions and direct environmental impact.

3.9.6 **Necessity:**

The Agency has ignored all comments relating to landfill reduction.

The Agency has failed to understand comments relating to energy efficiency – possibly deliberately. It also ignores Indaver's own comments relating to the Kalina cycle and CHP, which were the subjects of critical comments in the original submission.

The Agency has failed to address the question of an hazardous waste landfill.

3.9.7 **Options:**

Indaver was obliged to demonstrate that incineration was the BAT option. This was challenged in the submission.

The Agency has summarily dismissed the challenge. It is well aware that waste treatment options for waste generated on licensed sites is considered in the same arbitrary and superficial manner as Indaver has employed – and the Agency appears never to comment..

3.9.8 Technology:

Indaver were directly contradicted by the original submission.

The Agency has not bothered to check any facts and has again taken Indaver's application at face value. This is not merely grossly unprofessional but also a serious breach of the Agency's duties.

Not only would Indaver's selection of technology be suspect, but Indaver's integrity and competence would be suspect – and the Agency may then find some misleading or false information.

The Agency is incorrect in its assertions that the reformation of dioxins/furans will be minimized by the Indaver design. Reformation may be reduced somewhat but minimization can only be achieved by elimination of heat recovery and vitrification of residues.

3.9.9 Waste Application:

It is interesting to hear that the application form is merely a guide. However, certain information appears to be mandatory – such as accurate map references.

With regard to a specific flue gas abatement system, the Agency did not bother to inform objectors that further information was available. Furthermore, the Agency's memo (the subject of this review) appears to indicate that the selection of system is not yet finalized.

The Agency has not addressed the vast majority of the points raised and the RD certainly does not address most of the issues.

The Agency should have been concerned by many of the points raised, if only because of the poor impression of Indaver and its consultants, that they engender. Many points would be relatively uncontentious and Indaver should have been instructed to consider them and incorporate them into their design.

3.9.10 EIS:

The Agency has again ignored most of the points raised.

Whilst planning is not specifically within the EPA's jurisdiction, it cannot totally disregard planning issues – planning and environment are closely interrelated. The Agency has a duty to assess and consider the environmental impacts of planning issues.

Again the RD does not address most of the points raised.

3.9.11 Commissioning:

The Agency's attention is drawn to the fact that there are numerous instances of facilities breaching their licences, for many years, with impunity. The Agency has a poor record with respect to enforcement.

Furthermore, the Agency's attention is also drawn to the many examples of commissioning and test burn regulations, standards, codes of practice and requirements, issued by other authorities such as the USEPA.

4.0 Proposed Decision – Draft Licence

4.1 Condition 1

1.4 – each incinerator should be restricted to a maximum of 100,000 tonnes/annum.

1.5 – the Agency should clarify the position with regard to solvent recovery on site (sch. 4.1).

4.2 Condition 2

2.1.1 – "suitably qualified and experienced" is meaningless. Minimum qualifications and levels of experience must be defined.

2.1.2 – similar comments relate to "appropriate education etc".

2.2.1 (c) - this should be on a publicly accessible file.

2.3.3 (i) – this should be done prior to start-up.

2.3.3 (iii) – this report, together with the AER, should be publicly accessible.

2.3.7 – the requisite parameters should be defined and not left to Indaver to determine.

4.3 Condition 3

3.5.3 - if the scanner is defective, no waste can be accepted. The scanner must therefore require daily testing prior to opening the facility. There should be a continuous monitoring of the scanner condition and immediate reporting to the EPA of any failure.

3.7.5 – 5 years are far too long. The bunds should be inspected annually and tested every 2 or 3 years.

3.8 - ash storage should be fully enclosed in a bunded area.. This material must be considered hazardous until proven otherwise.

3.10.3 - the facility handles a range of solvents, many of which are miscible with water. An interceptor is therefore of very limited use. Even for some of the immiscible solvents, the interceptor will fail since they are denser than water (eg. methylene chloride).

3.12.3 - this report must be publicly accessible.

3.14.4 - Indaver and the Agency should indicate how this is to be achieved.

3.14.8 - the Agency should require vitrification of the bottom ash to reduce organic (particularly dioxin) contamination.

4.4 Condition 4

4.1.1.3 - this permits the discarding of 10% of measurements every day. This is grossly excessive.

4.1.2.1 – it would be more conservative to add the uncertainty error.

4.5 Condition 5

See emissions limits.

4.6 Condition 6

6.5 - again, competence is not defined. Furthermore, maintenance of the instruments should be carried out by an external, competent person.

6.6 – "representatively" should be defined.

6.8 - the Agency does not appear to know what standards actually exist.

6.9 - such calibration should be annual. Such equipment should also have auto-calibration capabilities.

4.7 Condition 7

7.4 - this should and could have been done already. It should certainly be completed prior to commencement of construction, since retrofitting will be far more expensive.

4.8 Condition 8

8.2.1/8.4 – the County Council and/or the EPA should be advised that neither has a good record in regard to auditing or policing such documents. The Agency is instructed to ensure that these documents are properly audited – and it is advised to review the format and structure of the entire system.

8.9 - the facility, as presently (optimally) designed, does not appear to have this capability.

8.13 - the environmental health implications of this type of storage should be considered.

4.9 Condition 11

11.1 (a) - the Agency should have a 24 hour emergency number. Indaver should inform the Agency within one hour of any incident.

4.10 Schedule B

Both the Agency and Indaver appear to agree that emissions will generally be <10% of the licence limits. This is particularly the case for dioxins.

The BAT limits should therefore be employed and, for example, the dioxin limit should be set at 0.01 ng/m^3.

The Agency appears to employ this argument in other sectors.

4.11 Schedule C

Waste input to the fluidized bed should be added. It is essential if efficiencies and performance are to be properly monitored.

Waste monitoring should be far more frequent until the variability can be established. In addition, toxicological tests should be made on the various wastes, to establish toxicity.

There should be a programme of ambient air quality monitoring, to verify the predictions of the various models – upon which both Indaver and the Agency place such reliance. This must be publicly accessible since it may be used to establish a causal relationship between the facility and adverse health effects in the community and subsequent claims for damages.

Mr Michael Kelly.
Secretary General
Department of Health and Children
Hawkins House,
Hawkins Street,
Dublin 2,
Ireland.

25 March 2003 MK/cm

re: Baseline Health Data

Dear Mr Kelly

I write to you in respect of concerns expressed by the public regarding human health in the vicinity of waste facilities, including landfill sites and incinerators.

The Environmental Protection Agency has statutory obligations set out in the Environmental Protection Agency Act, 1992, the Waste Management Act, 1996 and other legislation. The brief of the Agency includes the following:

- Licensing and regulating activities specified in legislation with a potentially high risk of causing pollution, including industrial installations and waste facilities
- Enforcing environmental legislation in relation to specified activities in both private and public sectors
- Monitoring and reporting on the state of the environment

To date the Agency has licensed waste facilities such as existing landfills, new landfills and incinerators attached to particular industries. In granting licences for the operation of these facilities the Agency sets stringent emission limit values for pollutants and potential pollutants to meet the accepted EU standards and guidelines as a minimum requirement. In addition, the Agency evaluates the potential impact of the maximum licensed emission on the environment surrounding any facility to ensure that all EU standards for the environment and WHO guidelines will be met. If these cannot be met, then the Agency will reduce the level of emissions licensed accordingly. The Agency takes the view that if the licensed emission limit is complied with, then human health is adequately protected in line with best international practice. To ensure compliance, the Agency requires the operators of the facilities to monitor and report on specified substances, and in addition conducts its own monitoring and auditing of the facilities. The Agency is confident that this approach, coupled with the requirement on the part of the licensee, to implement environmental management plans and to operate according to Best Available Techniques minimises the risk to public health and the environment.

Mr Michael Kelly
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However, the public continues to have concerns regarding the health impacts of these facilities, and expresses these concerns to the Agency in written submissions and objections to the issue of licences, and in submissions at Oral Hearings of objections held by the Agency in the licensing of some facilities.

A recent report commissioned by the Department of the Environment and Local Government and carried out by the Health Research Board concluded, inter alia, that Irish health information systems cannot support routine monitoring of the health of people living near waste sites, and points to a lack of available information on the health status of residents residing near waste facilities, and a lack of baseline human health data at national, regional and county level.

The Report on the Investigations of Animal Health Problems at Askeaton, Co Limerick , carried out by Department of Agriculture, Food and Rural Development, Teagasc, EPA and the Mid Western Health Board, and published in 2001 also identified a number of issues in respect of human health data, which needed to be addressed so that proper expertise and baseline data are available in the State. Amongst other things, this report recommended a computerised system of monitoring congenital abnormalities based on the Eurocat model, a system of surveillance of morbidity in general practice, and the structuring of information systems within the health service to allow easy epidemiological investigation.

The issue of baseline health data and adequate health information systems is a matter appropriate to the Department of Health and Children and the Health Boards. The Agency would support the recommendations on these matters referred to in the above reports, the implementation of which should help to alleviate the legitimate public concerns about the health impacts of the very necessary infrastructural developments in a modern economy.

If you would like further clarification of any of the issues raised here I would be pleased to discuss them with you.

Yours sincerely,

Dr. Mary Kelly
Director General

1

'No health check setup near waste sites'

Mary Dundon
Political Reporter

Environmental ction Agency (EPA) or general has warned is no system here to ely monitor the h of people living near erators and waste sites. e EPA has just granted er Ireland a draft waste se to operate a million hazardous incinerator in askiddy, Co Cork and €85m non-hazardous waste incinerator in Duleek, Co Meath. The public has 28 days to lodge objections.

But in a letter to the Department of Health seen by the Irish Examiner, the EPA director general Dr Mary Kelly warned there is no system to routinely monitor the health of people living near such contentious sites.

In the letter, Dr Kelly told the Dept a Health Research Board report had found that "Irish health information systems cannot support routine monitoring of the health of people living near waste sites".

The report also showed a "lack of information on the health status of residents residing near waste facilities and a lack of human health data at national, regional and county level," Dr Kelly stated.

She reminded the Dept that "the issue of adequate health information systems" was a matter for them and health boards.

In the letter to the Dept's secretary general on March 25, 2003, Dr Kelly said the EPA would support the implementation of systems which would help alleviate the concerns of people about the health impacts of these facilities.

Dr Kelly also said investigations of animal health problems in Askeaton, Co Limerick three years ago had identified issues in respect of human health data which needed to be addressed.

The report on Askeaton recommended a computerised system for monitoring congenital abnormalities, a system of surveillance of morbidity in general practice and the structuring of information systems in the health service to allow easy epidemiological investigation, Dr Kelly said.

Her letter was obtained by Fine Gael's Environment spokesman Fergus O'Dowd under the Freedom of Information Act.

"This shows the key issue of health and the impact of incinerators on public health is not being addressed and the EPA has confirmed they didn't have any in-house medical expert or seek the advice of an outside expert before granting the draft waste licence for incinerators in Cork and Meath," Mr O'Dowd said.

He will be raising the issue with Environment Minister Dick Roche in the Dáil tomorrow.

The EPA confirmed last night it supported the computerisation of data and structuring of information systems within the health services.

But the two waste licences for incinerators were granted in line with World Health Organisation standards, a spokeswoman said.

The EPA is satisfied the operation of the facilities at Ringaskiddy and Duleek will be in accordance with the conditions of the licence and will not endanger human health or harm the environment, she added.

CHASE
BENREOCH,
SPY HILL,
COBH,

C H A S E

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Cork Harbour for a Safe Enviro

We refer to the summary research and development needs set out in the Report published by the Health Research Board in 2003 on the health and environmental effects of landfilling and incineration of waste – a literature review. The Report identified the following needs and I quote:

"(a) Risk assessment
Ireland presently has insufficient resources to carry out adequate risk assessments for proposed
waste management facilities. Although the necessary skills are available, neither the personnel
nor the dedicated resources have been made available. In addition, there are serious data gaps
(addressed under point (c) below). These problems should be rectified urgently.

(b) Detection and monitoring of human health impacts
Irish health information systems cannot support routine monitoring of the health of people living
near waste sites. There is an urgent need to develop the skills and resources required to
undertake health and environmental risk assessments in Ireland. This should be considered as an
important development to build capacity in Ireland to protect public health in relation to
potential environmental hazards. The recommendations in the *Proposal for a National*
Environmental Health Action Plan (Government of Ireland 1999) could form a basis for this.

(c) Detection and monitoring of environmental impacts

The capacity (in terms of facilities, financial and human resources, data banks, etc.) must be developed for measuring environmental damage, and changes over time in the condition of the environment around proposed waste sites and elsewhere. There is a serious deficiency of baseline environmental information in Ireland, a situation that should be remedied. The lack of baseline data makes it very hard to interpret the results of local studies, for example around a waste management site. Existing research results should be collated and interpreted as a step toward building a baseline data bank. A strategically designed monitoring programme needs to be initiated that can correct deficiencies in current ambient environmental monitoring. In addition, capacity needs to be built in environmental analysis. In particular, Irish facilities for measuring dioxins are required, and should be developed as a priority. However, the high public profile of dioxins should not distract attention from the need for improved monitoring of other potential pollutants.

(d) Risk communication and perception

Qualitative studies about waste management perceptions revealed a diversity of opinion about waste management issues generally, and about the links between waste management and both human health and environmental quality. To facilitate public debate on the issues of waste management policy and effects, a systematic programme of risk communication will be necessary. This should concentrate on providing unbiased and trusted information to all participants (or stakeholders) in waste management issues. Public trust, whether it is placed in the regulators, in compliance with the regulations or in the information provided, will be fundamental in achieving even a modicum of consensus for any future developments in waste policy in Ireland.

(Source: Health Research Board, Dublin, 2003, page 8)

Subject: FW: Government...

Doc. 1

Government commissioned damning report on incineration

A major report on the effects of landfill and incineration was recently published by the H.R.B.The report was comissioned by the Health Research Bureau @ the request of the Dept. of Environment and Local Government. At the launch Dr. Ruth Barrington,C.E.O. of the H.R.B.said the report is an important contribution to informing the public debate about the effects of two options of waste management.

The report clearly links incineration and landfill to illnesses and found evidence of birth defects near landfill sites and acute and chronic respiratory illnesses from incinerator emissions."The evidence for a link between cancer and proximity to an incinerator is not conclusive and furher resaerch is required to determine whether living near incinerators increases the risk of developing cancer" according to Dr. Dominique Crowley. She further went on to say that her team concluded that the disposal of municipal solid waste through this method ie. incineration, produces a range of volatile and gaseous emissions...which can compromise environmental quality.

It further finds that the health of people living near proposed incinerators and dumps cannot be properly monitored by the authorities because of insufficient resources .This disclosure has lead to calls for the Government to halt its controversial plan for a network of incinerators in Ireland.

In a seperate report carried out by two French Government appointed organisations published on Jan. 21 2003 the report concludes that "globally,significant risks for the exposed populations are observed for two types of deformities " (in childbirth) and concluded that incineration is officially responsible for the birth of a significent number of deformed babies.This study was carried out in one of the biggest regions of the country and covers 70 incinerators.

These reports clearly vindicate the fears of Cobh Action for Clean Air (C.A.F.C.A.) and C.H.A.S.E.. This is indeed a damning report yet in last weeks paper, the Minister indicated that he would press ahead with his plans, despite the fact that it is now unquestionable that incineration has long-term serious health implications! The H.R.B. was a report comissioned by the Ministers department. It clearly states that it is not safe. What more proof does the minister need?

The experience of other countries who are now faced with serious health effects from incineration, should make it very clear to all concerned that other technologies must be considered.The proponents of incineration including Indaver Ireland ,who want to build the proposed incinerator in Ringaskiddy talk about "'state of the art" incinerators' suggesting that such incinerators would eliminate harmful emissions This is not so, and in August 2002 such an incinerator in Belgium run by Indaver ,was 1300 times over the allowed E.U. limits.How can one have any faith or trust in such an industry whose sole purpose is to make huge profits for themselves and their share holders.

Incineration is not safe and poses as a serious long-term threat to our health, environment and national economy.There are safer more innovative ways of dealing with our waste crisis.(Clean technology , green chemistry and the Zero Waate option have all been tried and tested and are i use all over the world. Galway went down the zero waste option two years and are now at 60% recycling) They may require a mind shift in the way we look at our waste, they may be more troublesome in terms of implimentation ,but in the long term they will guarantee us and our children, a better quality of life. Is this too much to ask for?

It is only people power that can...

Environmental Protection Agency

Mission, Vision, Values Goals and Objectives

Mission

Our Mission
To protect and improve the natural environment for present and future generations, taking into account the environmental, social and economic principles of sustainable development

Vision

Our Vision is to be
A powerful agent for change, both in attitudes to the environment and in actions on environmental protection
An organisation that works to place environmental issues at the heart of international, national and local decision-making processes.
A credible and respected organisation, speaking out courageously for the protection of the environment.
A world class organisation in which people are proud to work

Values

Our Values are
Integrity, independence and professionalism
Service to our stakeholders
Value for Money
Respect and support for colleagues
Openness to learning

Goals and Objectives

Goals and Objectives
To be a Powerful Agent for Change
To Build a High Performance Organisation
To Meet the Needs of Our Stakeholders
To Continually Evaluate and Improve What We Do

Note to Editors:

1. How the licensing process works:

- Given the complexity and scale of some waste activities, the EPA provides pre-application clarification and consultation so that applications are as complete as possible.
- Once received, the application is rigorously assessed by a team of experts from the Office of Licensing and Guidance.
- Extra information, including modelling, may be required from the applicant during this assessment.
- When the application is deemed complete, and has been fully assessed, the Office of Licensing and Guidance makes a recommendation on the application to the Board of Directors of the EPA.
- The Board assesses the recommendation, together with the application and all submissions, before making a decision.
- The Board's decision, in the form of a Proposed Decision (PD), is notified to the applicant, all third parties who made a submission on the application and other statutory consultees.
- There follows a 28-day period when any person can submit an objection, request an oral hearing and make submissions on other objections.
- All objections and submissions on objections are considered by a Technical Committee of the Agency, or through an oral hearing process, and the recommendations arising, together with the objections and submissions, are considered by the Board of Directors before making a final decision to either refuse a licence or to grant licence with or without conditions.
- The Agency is debarred in law from granting a waste licence unless it is satisfied that the activity concerned, carried out in accordance with such conditions as may be attached to a licence, will not cause environmental pollution.

2. Lodging an objection:

Information on the procedures for making an objection to the proposed determination or for making a request for an oral hearing can be accessed at

in a document entitled

Aspects of Licensing Procedures: Objections, Oral hearings.

Contact: Media Relations Tel: 053-70770 Fax: 053-60696 Email:
EPA Headquarters Tel: 053-60600 Fax: 053-60699 Website:

Conditions imposed include:

- a 5-stage abatement of waste gases to protect the surrounding environment;
- stringent management, monitoring and reporting requirements;
- a shut down of the facility in the event of any malfunction of abatement or monitoring equipment;
- a dioxin limit in air emissions of 0.1 nanograms per cubic metre (0.0000000001 grams per cubic metre);
- limits on heavy metal and acidifying gases in line with the Waste Incineration Directive;
- any municipal waste burned at the facility is restricted to material remaining after reusable and recyclable materials have, in so far as is practicable, been removed.

The Office of Environmental Enforcement will monitor and enforce these conditions through environmental audits, unannounced site visits and systematic checks on emissions. The EPA will also conduct dioxin surveys on an annual basis to monitor levels in the areas adjacent to the incinerators.

There now follows a 28-day public consultation period in which objections or requests for oral hearings can be lodged with the EPA. All objections, and submissions on objections, will be carefully considered before the EPA Board makes a final decision in each case.

A briefing paper, "Municipal Solid Waste Incineration as part of Ireland's Integrated Waste Management Strategy" is available on the EPA's web site at

As this is the first step in a statutory licensing process, the EPA is not in a position to comment on the specifics of the two facilities for which proposed decisions have been issued. The Proposed Decisions can be accessed on the EPA web site at

for Carranstown, Duleek, Co. Meath

and for Ringaskiddy, Co. Cork .

ENDS

Contact: Media Relations Tel: 053-70770 Fax: 053-60696 Email:
EPA Headquarters Tel: 053-60600 Fax: 053-60699 Website:

1. Introduction

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1.1 I am Dr David Santillo, Senior Scientist with the Greenpeace Research Laboratories, part of Greenpeace International.

1.2 The Greenpeace Research Laboratories are based within the Department of Biological Sciences at the University of Exeter, UK. I have worked with the Laboratories for more than nine years, providing analytical support and scientific information and advice to Greenpeace offices, to other non-governmental organisations and to members of the public around the world.

1.3 The laboratories specialise in analytical chemistry and have facilities for primary investigative research in that field. Over the years I have engaged in numerous analytical research projects, both alone and in collaboration with other university research groups, government and agency laboratories, relating to environmental pollution, particularly with regard to persistent organic pollutants and have published a number of scientific papers in this field.

1.4 I have also represented Greenpeace International at policy level for many years in a number of international treaties and conventions addressing environmental protection, manufacture and use of hazardous substances and hazardous waste management.

1.5 I have read the original planning application submitted by Indaver, the associated Environmental Impact Statement, the third party appeals and the responses to those appeals. Notwithstanding the large quantity of information presented, there are a great many aspects of the application and EIS which remain very unclear.

1.6 However, there are two things which are clear. Firstly, given the information which is available concerning the nature of the proposed facility, the activities to be engaged in at the facility and their possible consequences, including the risks and possible consequences of a major accident, it is my opinion that the proposed site is entirely unsuitable and that planning consent should not be granted.

1.7 In this context I would like, as a research scientist, to record the substantial difficulties presented in acting as an expert witness in relation to this application within a forum in which issues relating to the risks of environmental pollution and the risks to human health from the proposed development are inadmissible as evidence. Such issues are highly significant and directly relevant in relation to the siting of a facility which would be handling, storing and incinerating hazardous waste. It is very difficult to understand how any sustainable planning decision relating to a hazardous waste facility can be taken without detailed consideration of such issues.

1.8 Secondly, given the importance of implementing the National Hazardous Waste Management Plan in full, including the issues of waste prevention, waste

minimisation, recycling and recovery as hierarchical priorities above any disposal operations, it is clear in my opinion that the need for such a facility as that proposed is highly questionable. Any decision to permit the Indaver development in advance of these other waste prevention and management options being fully exploited would be a premature decision. I elaborate further on this and other points below.

2 Impact of the proposed facility on waste prevention

2.1 Hazardous waste prevention is a cornerstone of the National Hazardous Waste Management Plan. The operation of the proposed facility would take away many of the incentives to implement this cornerstone of policy.

2.2 Indaver claims that waste prevention advice is part of their standard service, and yet there is no evidence of that in the proposal. Indeed, the proposal runs entirely counter to that.

2.3 The EIS claims repeatedly that the Ringaskiddy facility would form part of an integrated waste management strategy. Clearly this is untrue – it provides only one element, at the lower end of the hierarchy, before other levels are in place, and reduces incentives to develop those other levels. The proposed community recycling facility is little more than a distraction – it will not provide for integration of waste management in the region, nor will it mitigate against possible negative impacts from the hazardous waste facility itself.

2.4 If the figures for hazardous waste generation in Ireland as a whole, and in Cork specifically, are accurate, then these figures demonstrate more the current inefficiency of operation of existing industry, and the urgent need for improved site-specific waste minimisation and recovery programmes, not the urgent need for a bulk incinerator. The additional fact that much of the tonnage of hazardous waste expected to go to the facility are waste solvents makes this waste minimisation priority even more evident.

2.5 The types of wastes described as possible inputs to the incinerator cannot reasonably be classed as residual wastes. Such arisings occur as a result of inadequate waste management practices which can and should be the primary focus for the implementation of the Hazardous Waste Management plan.

2.6 The claim is also made that the current lack of a bulk hazardous waste incinerator is hampering the further industrial development of the region and the economy of Ireland as a whole. What is the evidence for this? Moreover, does Ireland really want to attract to Cork, or anywhere else, more industries which are inefficient or incapable of managing their processes and preventing wastes in a more sustainable way? How does this fit with the regional development plans?

2.7 Throughout the EIS and related documentation, the services and proposed benefits to be provided by the Ringaskiddy facility are compared against a "do nothing" alternative. This is rather disingenuous – this is NOT the only alternative... in

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2.7 Throughout the EIS and related documentation, the services and proposed benefits to be provided by the Ringaskiddy facility are compared against a "do nothing" alternative. This is rather disingenuous – this is NOT the only alternative…in fact, it is NOT an alternative at all. Something must be done, but the focus should be on waste prevention, consistent with the Hazardous Waste Management Plan. Until such time as these aspects are being implemented, the need for and scale of any proposed disposal facility cannot be determined.

3 Site selection and classification

3.1 The EIS refers to use of the WHO guidance on site selection for new hazardous waste management facilities. However, it is unclear from the EIS precisely which aspects from this guidance were considered and how conclusions were drawn. Furthermore, the WHO guidance stresses clearly that proper site selection relies on public support and acceptance of the need for the facility – I would question in this case whether that had been achieved.

3.2 The EIS goes on to state that the nature and quantities of wastes to be received, stored and handled on the site lead to classification as a lower tier site under the Seveso II Directive. However, this classification depends on a detailed inventory of the wastes to be received, stored and handled, including specific limits on materials with different hazard ratings. At this time, it would appear that insufficient information is available to Indaver on likely waste arisings, specifically relating to the quality and hazards of wastes, in order to inform such a judgement. I have read the EIS, the appeals and the responses to appeals in detail and though I can find a number of references to the lower tier classification of the site, I cannot find the information on which this judgement is based.

4 Process control and safety issues

4.1 What measures will be in place to address spills or fugitive emissions occurring outside of bunded areas and/or negative pressure zones? What emergency facilities and procedures would be followed in such cases?

4.2 No facility of this nature can be entirely sealed so as to prevent any fugitive emissions of volatile organic compounds, and yet no estimates are given in the EIS regarding the likely nature and scale of such emissions. It appears from the EIS that the precise mechanisms for capture of such vapours have not yet been finalised. Moreover, what will be the fate of contaminated filters used for such a purpose?

4.3 What measures will be taken in order to prevent any significant risk of explosion during offloading, transfer, blending or spills of flammable wastes?

4.4 Protection of groundwater depends entirely on normal operation of the plant and the integrity of its buildings and bunds – there is no consideration of threats to groundwater which may result from unforeseen spills, leaks or other accidental releases, nor any consideration of how groundwater quality would be protected in the event of such incidents.

4.5 The EIS makes the claim that there is nothing in the proposed purpose and activities of the plant which differs, either in nature or scale, from activities already taking place in the Ringaskiddy area. On the basis of what evidence and quantitative data is this judgement based?

5 Technical questions relating to the operation of the facility

5.1 What processes will be used in the cleaning of drums or containers in which wastes are delivered to the plant? What will be the nature and fate of wash waters or other cleaning materials from such operations?

5.2 The EIS states that run-off and certain other aqueous waste streams will be tested prior to making a decision on final disposal route. For what parameters will such wastes be tested? What methods will be used?

5.3 The waste bunker is described as having a sump which is designed to be water-retaining. What will be the nature of the barriers used? How effective will these materials be in preventing the leaching of, and/or corrosion by, the types of wastes to be stored in the bunkers? What facilities will there be to monitor the integrity of the retaining facilities and the quality of underlying groundwater? How far above the water table will the bottom of the sump be?

5.4 The EIS states that the precise operational conditions of the fluidised bed incinerator and afterburner will need to be set according to the nature of the waste

being incinerated at any one time. However, this mix of waste in relation to solids will be determined only by the rather arbitrary process of mixing by crane, controlled entirely by the crane operator. It is difficult to envisage how precise process controls within the fluidised bed can be controlled on this basis, in order to ensure continuity of complete burnout.

5.5 How will the quality of the liquid waste stream be determined? Once again the combustion conditions will be set on the basis of waste quality at any time, including the chlorine content of the waste. How will this be monitored and controlled and over what timescale will alterations of combustion conditions be possible? According to the predicted annual influx of liquid hazardous wastes, daily deliveries would be in the range of 100 tonnes. This is a large volume for which the quality and blending/compatibility properties will need to be controlled.

5.6 What is the standing capacity of the fluidised bed incinerator? What is the minimum retention time for wastes and how (and on the basis of which criteria) will this be controlled?

5.7 Reference is made to the potential for fires breaking out in the solid waste bunker. Is it really feasible that domestic ash could end up mixed with such hazardous and potentially flammable solid wastes?

6 Emissions to air

6.1 The EIS makes numerous references to the use of "worst case" scenarios in determining impacts on air quality. But what is the true worst case in terms of emissions during operation? We are all aware of the problems experienced last year and early this year by one of Indaver's incinerator facilities in Belgium. Notwithstanding the fact that the kiln was shut down once the problem was discovered, a very substantial quantity of dioxins (and, we can only assume, a wide range of other hazardous substances) were released before the problem was discovered. Is the proposed Ringaskiddy facility substantially equivalent to this Belgian facility? In the event of a fault or other unforeseen breach of emission limits, what is the maximum period over which elevated emissions may continue before the problem is discovered and the furnace shut down? How will the memory effect be avoided?

6.2 Under typical operating conditions envisaged by Indaver, the facility will release 22 ug TEQ dioxins each day. This is a substantial amount, and must be considered in terms of total daily load released, nut just in terms of the stack gas concentration. It is not only the concentration but also the flow rate which is of significance.

6.3 Similarly, concentrations of mercury released may look low, but total quantities under normal operations could amount to ~~100~~ 50g per day. And this at a time at which UNEP is trying to reduce and ultimately eliminate emissions of mercury to the environment.

6.4 The EIS places great emphasis on the fact that estimated deposition rates once the facility is operational are still likely to fall below levels recorded in urban and industrialised areas of Europe. Such a comparison not only detracts from the fact that deposition rates are predicted to increase by almost 20 times as a result of phase 1, but also fails to recognise the intrinsic value of currently low ambient deposition levels. Such low levels in comparison to other parts of Europe are part of the asset of Cork Harbour to be preserved, not a justification to increase pollution.

6.5 People don't come to Cork, or more generally to Ireland, in order to experience Paris or London – they come for the clean environment.

6.6 From where do the estimates of ambient TOC arise? It appears that no details are given regarding analytical methods for this parameter. TOC can include a high proportion of volatile organic compounds (VOCs) which are important pollutants in their own right and can, through interaction with e.g. NOx, contribute to the formation of ozone and other priority pollutants in the lower atmosphere.

6.7 With regard to TOC, the identification of the site as a class III location in relation to USEPA PSD has substantial consequences for the comparison TOC levels against standards and guidelines. On what basis is this classification made?

6.8 It would appear from the EIS that some of the methods used for the baseline monitoring of certain metals and metalloids were inappropriate as they were incapable of determining concentrations down to and including limit values for those substances. This should be an indication that alternative methods should be pursued, not an indication for complacency and subjective judgement relating to significance of future emissions. Moreover, even when exceedence in ambient levels did occur, in the case of nickel, this is addressed in the EIS by simply negating the results and stating again that this will not be an issue once the plant is operational. If this level of analysis and judgement underlies this aspect of the supporting studies for the EIS, what guarantee is there that other aspects have been conducted to any higher quality?

6.9 In relation to SOx, annual limit values for the protection of ecosystems are presented, but estimated process contributions and total emissions of SOx from the facility are then only compared against shorter term quality limits, not against this annual limit.

6.10 Hazardous waste incinerators emit a wide range of hazardous organic chemicals. The EIS makes reference to relatively few of these and, indeed, specifically excludes consideration of PCB formation and emissions from the stack. Other compounds of significance which may be emitted through normal operations include polychlorinated naphthalenes, polybrominated dioxins and furans and mixed chlorinated/brominated dioxins and furans, polycyclic aromatic hydrocarbons (PAHs). These arisings simply have not been considered in the EIS, despite the substantial additional hazards presented by such compounds.

6.11 Precisely how will the level of hazard of ashes and other solid wastes arising from the facility be determined? Will this be a one-off assessment or will it be

reassessed regularly to reflect quality changes in the waste received and changes in operational parameters of the facility?

7 Waste to energy – contribution to renewable energy targets

7.1 Hazardous waste, in the form of solvents and other such wastes from industrial sources, is not a renewable source of energy – these are primarily fossil-fuel based products. The fact that a waste stream is continually produced does not make it renewable. CO_2 emissions from the incineration of hazardous wastes cannot be offset against renewable energy targets.

8 Climate change

8.1 The facility, if constructed, will be a long-term operation. To what extent has the planning application and the consideration of this application take account of the need to adapt to the future consequences of global climate change? What consequences would there be sea level rise, changes in rainfall, changes in thermal structure of the lower atmosphere, etc. on the safety and environmental impact of the plant? Clearly these are highly pertinent planning issues which have fundamental bearing on the process of site selection.

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Summary

8.1 A unifying theme underlying much of the evidence I have presented to this hearing is the need for precaution, essentially the need to take action wherever possible to avoid harm or the potential for harm in advance. Ireland, through various of its commitments and obligations under international law, including EU law, is committed to the application of the precautionary principle. Sadly, the reality in the majority of cases involving the impact of human activities on natural resources and human health, is that the need for cautionary action is recognised only after the damage is done. At that stage, corrective action can be impossible or, at best, extremely difficult and expensive. In the case of planning decisions such as this, however, the Bord has the rare opportunity to take a truly precautionary decision in order to avert harm that might otherwise be caused, either through routine operations of the facility or as the consequence of unforeseen incidents or accidents.

8.2 The need for precaution extends also to the potential for negative impacts on the implementation of waste management objectives which are above disposal within the hierarchy. In other words, if there is any uncertainty as to whether granting permission for the construction of the proposed facility would be entirely consistent with the implementation of higher order aspects of the National Hazardous Waste Management Plan, including the primary objective of waste prevention, then granting permission at this stage would be inadvisable and premature.

8.3 In short, there is a choice of two directions to take. The decision could be taken to uphold the refusal of permission, a decision which would contribute towards the pursuit of more sustainable solutions for waste management and the sustainable development of the Cork Harbour area as a whole. Alternatively, a decision to grant permission would effectively consign Ringaskiddy and the Cork Harbour area to become the hazardous waste capital not just of Cork, but potentially of Ireland as a whole.

8.4 A decision to grant approval would have a number of consequences.

8.4.1 It would lead to the creation of a major accident hazard in an area which is by no measure remote from residential areas and other developments and activities, which is located on the shores of an internationally important marine area and which is by no means best served by existing emergency services. The availability of sufficient access and escape routes to and from the site in the event of a major incident is also questionable.

8.4.2 It could open the door to the development of industrial facilities and activities which do not take full regard of opportunities for waste prevention or minimisation.

8.4.3 It would compromise the proper implementation of the National Hazardous Waste Management Strategy by focusing at the lower end of the waste management hierarchy and by reducing or removing entirely incentives to develop higher order solutions as required under the plan.

8.4.4 It would also compromise the very forward-looking proposals already in existence to re-develop the Cork Harbour area in a more sustainable manner.

8.4.5 And finally it would give a green light to the reality of increased contamination of the environment with heavy metals and persistent organic pollutants; irrespective of risks and consequences of environmental pollution, such a trend would be fundamentally unsustainable.

8.5 If planning permission is granted for the construction of this facility, then it seems inconceivable that the necessary licences for the operation of the facility to the proposed specification will be refused. The EPA is essentially a permissive body in this regard and, even if certain operating conditions are imposed, any such conditions cannot prevent the release of hazardous wastes from the facility nor avoid entirely the potential for a catastrophic accident. In this regard the people of Ringaskiddy and of Cork more widely could not then rely on the EPA to protect their environment. Nor, it would seem, could they rely on anyone to protect their own health from the consequences of this facility. This, then, is the responsibility before the Bord.

END

Proof of Evidence

Site Selection Issues and Comment on the General Health Implications of Major Accidents and Fugitive Emissions during upset conditions and 'excursions', with particular reference to the Toxicological Effects of Ultrafine Particulate Aerosols

by

Dr C V Howard MB. ChB. PhD. FRCPath.

Public Inquiry into the Planning Application by Indaver to construct a Waste Management Facility at Ringaskiddy

1 Introduction

Statement by Dr C V Howard MB. ChB. PhD. FRCPath.

1.1 Scope of the Evidence

I have been asked to examine the potential health impacts of the proposed incinerator at plant at Ringaskiddy, with respect to major accidents or upset operating conditions and fugitive emissions. My evidence will address the effects of the most problematic particulate and gaseous emissions, in the light of the latest scientific knowledge. I will also address some of the deficiencies in the documentation presented by Indaver, which make it very difficult in a numer of aspects to be able assess the impact of the proposed plant under upset, or any other, operating conditions.

1.2 About the Author

I qualified in Medicine in 1970 at the University of Liverpool and after registration with the General Medical Council, started a career in research at that institution. The central theme of my research has always been centred on the development of the fetus and neonate. I am currently a Senior Lecturer and Head of the Developmental Toxico-Pathology Group at the University of Liverpool. I am a Fellow of the Royal College of Pathologists.

In March 2003, I was appointed to the Advisory Committee on Pesticides (ACP), an official body which advises ministers on the regulation of pesticides.

In 1983, I obtained the degree of Doctor of Philosophy at the University of Liverpool for research into the development of the immature brain, using 3-D microscopy techniques. At this time I was appointed an Editor of the Journal of Microscopy, which is an internationally recognised publication and the official journal of the Royal Microscopical Society. In 1985 I was appointed General Editor in overall charge, a post that I held until 1992.

I have developed a number of assays (tests) for measuring biological tissues with microscopes, which come under the general heading of stereology. These tests are now becoming used in the pharmaceutical industry as very sensitive toxicological tests to detect minimal change. They are of particular importance in developmental pathology. There is an International Society for Stereology with some 500 members world-wide. I was elected President of this society from 1991-95.

I was President of the Royal Microscopical Society from 1996-8. I was awarded the 150th Anniversary Gold Medal of the Royal Microscopical Society for services to microscopy. I am a member of the British Society of Toxicological Pathologists.

Over the past dozen years, the Developmental Toxico-Pathology Group at Liverpool has developed an international reputation for its work on fetal development and the insight that has been gained in detecting the permanent damage that the fetus can sustain if its growth is perturbed. More recently the group has been working on the developmental toxicology of chemical mixtures.

I have appeared as an expert witness in a number of previous planning inquiries in relation to public health implications which arise from emissions from waste combustion plants, with particular reference to the unborn and newly born child and long-term health effects.

2 Background – Basic Concepts.

2.1 The Nature of the Waste Stream has Changed

The nature of the waste stream has changed profoundly over the past 100 years. The majority of the combustible portion of the waste stream originally consisted of wood products, including paper, and fabrics made from natural fibres. Subsequently the content of toxic materials, including heavy metals and plastics, has inexorably risen in both proportion and volume. This change has made what was originally a waste mixture that would probably have been no more dangerous to burn than any other fossil fuel, into a much more hazardous proposition.

2.2 Changing Practice

The policy of the waste industry over many decades has been to 'dispose' of waste in a way that put it out of sight and hence out of mind. Until recently this has been achieved primarily by using landfill, an activity that has already left a toxic legacy for future generations. The waste management industry is now being forced to substantially reduce this activity, due to the Landfill Directive 1999/31/EC. The industry's response is to fall back on an old fashioned technology, incineration, that is no longer suited to the modern waste streams.

2.3 The Policy Framework

When considering the health risks that may be associated with an application to treat or dispose of waste a principle foundation upon which European legislation is developed is the Waste Framework Directive (75/442/EC as amended by 91/156/EC) and particularly Article 4, which provides as follows:

"Member states shall take the necessary measures to ensure that waste is recovered or disposed of without endangering human health and without using processes or methods which could harm the environment, and in particular:

without risk to water, air, soil and plants and animals;

without causing a nuisance through odours;

without adversely affecting the countryside or places of special interest".

This is undoubtedly a stringent duty. At the least then the duty should be interpreted as a requirement to use the process which presents the least 'hazard'. If there is no 'hazard' then 'risk' is eliminated – this removes the uncertainties associated with mathematical (and historically unreliable) 'risk assessments'.

Article 3 of Council Directive 97/11/EC states that;

"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11, the direct and indirect effects of a project on the following factors:

human beings, flora and fauna..."

Paragraph 3 of Part 1 of Schedule 4 to the 1999 Regulations which transposes Article 3 of the Council Directive requires:

"A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population..."

Whilst Paragraph 4 of Part 1 of Schedule 4 states that such description as required by Paragraph 3 should cover;

"...the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development resulting from:

(a) the existence of the development;

(b) the use of natural resources:

(c) the emission of pollutants, the creation of nuisances and the elimination of waste

It is therefore clear that both the Council Directive regard human beings as an integral part of the environment and it follows that any likely significant effects on populations should be assessed as part of the EIA process.

The Article (2) of the Directive requires that **before** a "development consent" (defined by Article 1(2) as "the decision of the competent authority or authorities which entitles the developer to proceed with the project") is given for relevant projects member states must adopt measures to ensure that an assessment with regard to their direct and indirect effects is completed.

It is not reasonable, therefore, to leave matters solely the Environment Protection Agency to decide in the course of future licensing. The Environmental information must be considered before any development consent is granted.

- In this case the Environmental Statement also contains serious omissions, concerning upset conditions, of the relevant information on likely significant effects on human beings.

2.4 Consideration of WHO Regional Publications Series no 46: 'Site Selection for New Hazardous Waste Management Facilities: ISBN No 92 890 1309 5

Principles and Components of Planning and Siting

"Site selection should take account of three major considerations: Protection, equity and economics. As to the first the risk posed by a facility should not exceed socially accepted standards for involuntary risks.

The publication contains details of a screening process which the WHO appears to find appropriate. This is a four step process. Step 1 eliminates unsuitable areas which are described at page 79. The Step 3 criteria address socio-economic and environmental concerns that could affect the health and wellbeing of communities as well as geological and hydro-geological factors. One of these factors describes the necessity to avoid areas with shellfish harvesting. Step 4 factors cover what the report describes as "aspects of community impact". These include "*proximity to population – dwellings*" and "proximity *to*

incompatible land uses-commercial centres, schools and places of worship, airports and hazardous facilities"; "response times of rescue squads".

On page 34, Table 2, exclusionary factors in site selection are discussed. Two of these are:

"6. Surface water, which preclude sites above and existing reservoir or a location designated as a future reservoir or above an intake for water used for human or animal consumption or agriculture and within a distance that does not permit response to a spill based on high flow (most rapid) time of travel"

"7. Atmospheric conditions such as inversions or other conditions that would prevent the safe dispersal of an accidental release."

"13. Stationary populations such as those of hospitals and correctional instiutions"

"14. Inequity resulting from an imbalance of unwanted facilities of unrelated function or from damage to a distinctive and irreplaceable culture or to people's unique ties to a place"

2.5 The Stockholm Convention on Persistent Organic Pollutants (POPs)

The Stockholm Convention on Persistent Organic Pollutants (POPs) is an international treaty, concluded in 2001, that seeks to protect human health and the environment from a particular class of synthetic chemicals, namely POPs. Initially, the treaty applies to 12 pollutants, of which eight are pesticides, two are industrial chemicals (hexachlorobenzene and PCBs); and two are produced only as unintentional byproducts (dioxins and furans). In fact, the latter three are themselves classes of chemicals. The treaty includes provisions to expand this list to include other chemicals, using the Precautionary Principle to judge their fitness for inclusion in the list.

Although the Stockholm Convention does not ban incineration or even the construction of new incinerators, it does place serious obstacles in the path of any incineration project. The Convention specifically states in Annex C that "waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge; cement kilns firing hazardous waste" are among the technologies that have the "potential for comparatively high formation and release of such unintentional POPs." In fact, incinerators are significant sources of four of the 12 listed pollutants: dioxins, furans, PCBs, and hexachlorobenzene. As such, incinerators as a class are clearly subject to the restrictions of the Stockholm Convention. The Convention requires parties to take "measures to reduce the total releases derived from anthropogenic sources" of the unintentional POPs. Within this context, it becomes very difficult to justify any new or additional sources of POPs, such as a new incinerator or increased quantities of waste sent to an existing incinerator. This could be interpreted to allow new sources of POPs if they were counterbalanced by much deeper cuts in POPs production or releases from other sources; but that is not made explicit in the treaty. As it stands, the treaty clearly requires parties to take action to reduce overall releases. In fact, the Convention goes further; it is the strongest legal expression to date of the preference for source prevention over mere control of environmental hazards. For most of the intentionally produced

POPs, the Convention requires elimination. For the unintentionally produced, or byproduct, pollutants, the treaty's Article 5 establishes a goal of their "continuing minimization and, where feasible, ultimate elimination."

The Stockholm Convention makes a significant departure from past policy regarding incineration's environmental impacts because it does not apply to air emissions alone for determining dioxins minimization rates. Rather, the Stockholm Convention looks at *total releases*, which include solid and liquid residues, including residues from air pollution control devices (fly ashes). Most past justification of incinerators was based on the argument that dioxin emissions to the atmosphere could be captured and therefore controlled. However, the Stockholm Convention considers such solid and liquid releases to be part of what must be continually minimized and, where feasible, eliminated. Indeed, Article 5 also contains a particularly relevant substitution principle, which states that Parties to the treaty shall "Promote the development and, where it deems appropriate, require the use of substitute or modified materials, products and processes to prevent the formation and release of [unintentional POPs]." It is important to note the use of the term "formation" and to realize that this obligation makes it apparent that where there are alternative methods of waste management, any process that produces dioxins should be avoided. Again, with such clear signals provided for in this new body of international law, it is especially difficult to justify creating a new source of unintentional POPs, no matter how many end-of pipe control measures are envisaged. The Convention recognizes that such technologies are not equivalent to preventing the formation of POPs, and therefore specifically calls for the use of substitute processes.

While it is true that many countries currently continue to operate various types of incinerators, the Stockholm Convention has placed the future of incineration and all waste combustion in doubt. Existing incinerators will no doubt continue to operate for some years to come, but it will now become increasingly difficult to justify the construction of new incinerators. As feasible alternatives exist to all types of incineration, the treaty's requirement to "eliminate and substitute" processes for new sources will be the operating principle. Indeed it will take a fundamental bending of the intent of the Stockholm Convention to promote any new source of POPs while alternatives exist. One hundred twenty-seven nations signed the treaty in May 2001 in Stockholm. While the Convention will not come into force until 50 nations have ratified it (currently there are about 34 signatories), and then only in the ratifying countries, it is not toothless in the interim. Under international law, signing a treaty is a statement of commitment to comply with the treaty; and governments that do sign are enjoined from taking actions that are clearly prejudicial to the goals of the treaty, even though they may not yet have ratified it. As such, the Stockholm Convention is already a barrier against the construction of any new incinerator in signatory nations.

2.6 The Precautionary Principle

An important but underutilised aspect of the national waste strategy, 'Waste Strategy 2000', (WS 2000) is the "precautionary principle". WS 2000 cites the Rio definition:

The Rio Declaration on Environment and Development defines the precautionary principle as follows: "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".

Precaution is not just relevant to environmental damage – for example, chemicals which may affect wildlife may also affect human health.

And the box (Vol 2, paragraph 3.2) says "*Any integrated waste management system must make allowance for the precautionary principle*". I consider that the principle should be taken into account more seriously when considering applications such as this where there is significant scientific uncertainty and serious risks of harm. The precautionary principle is a means to safeguard public health. The European Commission advice is that the precautionary principle should be applied where[1] "there are reasonable grounds for concern that potential hazards may affect the environment or human, animal of plant health, and when at the same time the lack of scientific information precludes a detailed scientific evaluation".

2.7 Matter cannot be Destroyed

The process of incinerating waste does not destroy anything, 'matter cannot be created or destroyed'. Incineration is a method of waste dispersion, which superficially gives the impression that a process of disposal has been performed. Thus when waste is combusted, it is transformed into gases, particles and ash. The gases are dispersed to the air, the particles either go to air or are arrested on filters as 'fly ash', and the 'bottom ash' or clinker remains inside the combustor. All of the heavy metals that are in the waste find their way into one of these phases. In addition, toxic organic compounds formed during the combustion process are also emitted as gases, on particles, or in ash. Thus all of the effluvia from waste incinerators pose problems for human and environmental health as well as for disposal.

[1] European Commission Communication on Precautionary Principle, 2 February 2000

3 The Generation of Persistent Organic Pollutants (POPS), including dioxins

3.1 Human Body Burdens Are Already Too High

There is now evidence that human populations have too much dioxin-like substance in their bodies. The sections of the population who are the most vulnerable to health effects are the fetus in the womb and the nursing child. These chemicals can have effects on the endocrine system (Koppe 2000, Koppe et al. 2001), and can affect the development in the womb of many of the essential organs and systems, including the reproductive system, the immune system, the brain, kidneys, lungs etc. Some of these effects have been demonstrated to occur at current background levels.

3.2 Deficiencies in the Environmental Statement with respect to POPs

There is no analysis of the likely composition waste stream to the plant, apart from a passing statement about the chlorine content being 'between 3 and 4%' (Section 3.8.5). It could be expected that there would be a considerable proportion of organo-brominated compounds but no details on the estimated conten is given. This also applies to heavy metal content. It is therefore rather difficult to estimate the health outcome from fugitive emissions during excursions. However the evidence of Dr Gavin ten Tusscher to this inquiry should be noted in this respect.

With respect to discharges to water, there is again little information. Liquids will be stored in holding tanks while chemical testing is performed. Upon receipt of the analysis the decision to commit the liquid to the incinerator or to the public drain will be made. No comment about the capacity of the holding tanks is given. The methodology of analysis, standing of the laboratory, or response times for analyses have been given. No information about the permitted level of contaminant is given. We can gain insight into this by examining the Environmental Protection Agency IPC Licence Reg No 545 for Novartis Ringaskiddy Ltd (32/10/2000) which granted a permit for up to 200 cubic metres of liquid with up to 0.3 ng/litre of dioxins TEQ to be discharged per day. This was actually a permit to discharge up to 22 g of dioxin per year, which is about 30% of the current estimated annual emission for Ireland. As I understand it any discharge to the public drain would then be discharged to waters of Cork harbour. The possibilities for polluting the marine food chain are large. These matters require more elucidation and appear to be relevant planning considerations.

4 The Relevance of Recent Research on the Health Effects of Respirable Particulate Aerosols on Health

4.1 Nanoparticles

Nanoparticles, or Ultrafine particles (UFP) are very small pieces of matter defined as having dimensions less than 10^{-7} m. They constitute a small proportion of the mass of almost all types of particulate material. They also constitute the majority of the number of particles found in aerosols produced as a result of combustion processes. Their importance in the field of catalyst manufacturing, where their high surface area has a very great influence on reactivity, is widely known (Jefferson & Tilley, 2000). However, at present we know relatively little about their detailed structure, or their chemical and physical properties.

4.2 Atomic Structure of Nanoparticles

It is only in the last twenty-five years, with the advent of high-resolution electron microscopy (HREM) at sub-0.2 nm levels, and the consequent ability to resolve inter-atomic spacings at this level, that any real attempt has been made to determine the atomic structure of ***individual*** particles. What has been learned is that these minute particles have an increasing proportion of surface atoms as the particle size decreases. This leads to imbalances between the number of atoms and number of electrons present and hence the particles can be electrically charged. Thus they tend to have a higher chemical reactivity. In addition, novel configurations of atoms have been demonstrated in nanoparticles, which cannot exist in the bulk material (Jefferson & Tilley, 1999).

4.3 Highly Reactive Surfaces

The ultrafine fraction of a particulate mixture will usually represent only a small proportion of the mass of the particles present. However, when the total surface area of the particles in an aerosol is considered, a very high proportion will consist of the highly chemically reactive surface of the smallest ultrafine particles. It is on this surface that catalytic reactions, such as the formation of halogenated organic molecules, can occur. Some of the most reactive nanoparticles to have been studied to date are metals and spinel metal oxides (Jefferson & Tilley, 2000). However, research is now showing that when normally harmless bulk materials are made into ultrafine particles they tend to become toxic. Generally, the smaller the particles, the more reactive and toxic their effect (Donaldson et al 2000, Oberdorster 2000). This should come as no surprise, because that is exactly the way in which catalysts are made, to enhance industrial chemical reactions. By making particles of just a few hundred atoms you create an enormous amount of surface, which tends to become electrically charged, and thus chemically reactive. The upper size limit for the toxicity of UFPs is not fully known but is thought to lie between 65 and 200 nm (Donaldson et al. 2000).

5 Health Effects of Ultrafine Particulate Aerosols

5.1 Effects of Particle Mixtures

The effect of mixtures of particles of differing chemical composition entering the blood stream via the lungs in large numbers on a daily basis is beginning to be understood. There is no doubt that some particulate aerosols are indeed hazardous. However the degree of hazard associated with specific types of particle and the precise mechanisms by which exposure leads to pathology are as yet poorly understood and currently the subject of increasingly intense research. I recently reviewed the literature on the health effects of nanoparticles, which include ultrafine particles (Howard 2003)

5.2 Deaths from Air Pollution

According to researchers at Harvard University's School of Public Health (Dockery *et al.*, 1993), air pollution from combustion processes in cars, lorries and power plants, is killing roughly 60,000 Americans each year. This represents about 3% of all U.S. deaths every year. Every combustion source is contributing to the death toll; none is benign, including: incinerators; cement kilns; soil burners; flares and after-burners; industrial and residential heaters and boilers; cars; buses; trucks; and power plants.

5.3 Threshold Levels

The culprit appears to be the ultra fine particles created by combustion. Fine particles are not captured efficiently by modern pollution-control equipment. Furthermore, they are not visible except as a general haze. According to more than a dozen studies, there seems to be no threshold, i.e. no level of fine-particle pollution below which no deaths occur. The Harvard researchers have found that even air pollution levels that are well within legal limits are killing people, especially older people and those with chronic heart and lung ailments. Furthermore, studies indicate that fine-particle pollution is causing or exacerbating a wide range of human health problems, including:

a) initiating and worsening asthma, especially in children;
b) increasing hospital admissions for bronchitis, asthma and other respiratory diseases;
c) increasing emergency hospital visits for respiratory diseases;
d) reducing lung function (though modestly) in healthy people as well as (more seriously) in those with chronic diseases;
e) increasing upper respiratory symptoms (runny or stuffy nose; sinusitis; sore throat; wet cough; head colds; hay fever; and burning or red eyes);
f) increasing lower respiratory symptoms (wheezing; dry cough; phlegm; shortness of breath; and chest discomfort or pain); and
g) heart disease.

5.4 Ingress of particulates

Since 1987, the U.S. Environmental Protection Agency (EPA) has been measuring PM_{10} air pollution. The size of the particles is the most important issue from a public health viewpoint. Particles larger than 10 μm generally get caught in the nose and throat, never entering the lungs. Particles smaller than 10 μm (PM_{10}) can get into the large upper branches just below the throat where they are caught and removed (by coughing and spitting or by swallowing). Particles smaller than 5 μm (PM_5) can get into the bronchial tubes, at the top of the lungs. Particles smaller than 2.5 μm ($PM_{2.5}$) in diameter can get down to the

deepest (alveolar) portions of the lungs where gas exchange occurs between the air and the blood stream, oxygen moving in and carbon dioxide moving out.

There is considerable evidence to show that inhaled UFPs can gain access to the blood stream and are then distributed to other organs in the body (Kreyling *et al.* 2002, Oberdörster *et al.* 2002).

There appears to be a natural 'passageway' for nanoparticles to get into and then subsequently around the body. This is through the 'caveolar' openings in the natural membranes which separate body compartments. These openings are between 40 and 100 nm in size and are thought to be involved in the transport of 'macromolecules' such as proteins, including on occasion viruses. They also happen to be about the right size for transporting UFPs. Most of the research on that, to date, has been performed by the pharmaceutical industry, which is interested in finding ways of improving drug delivery to target organs. This is particularly so for the brain, which is protected by the 'blood brain barrier' which can be very restrictive. This has been reviewed by Gumbleton (2001).

Although there are clear advantages to the intentional and controlled targeting of 'difficult' organs, such as the brain, with nanoparticles to increase drug delivery, the obverse of this particular coin needs to be considered. When environmental UFPs (such as from traffic pollution) gain unintentional entry to the body, it appears that there is a pre-existing mechanism which can deliver them to vital organs (Gumbleton, 2001). The body is then 'wide open' to any toxic effects that they can exert. The probable reason that we have not built up any defences is that any such environmental toxic UFPs were not part of the prehistoric environment in which we evolved and therefore there was no requirement to develop defensive mechanisms.

5.5 Most dangerous particles

Particles smaller than 2.5 μm in diameter ($PM_{2.5}$) are potentially the most dangerous particles, because the deepest (alveolar) portions of the lung have no efficient mechanisms for removing them. If these particles are soluble in water, they pass directly into the blood stream within minutes. If they are not soluble in water, they are collected by scavenging cells called macrophages and then transported to lymph nodes, where they are retained in the deep lung for long periods (months or years) (NRC, 1979). About 60% of PM10 particles (by weight) have a diameter of 2.5 μm or less whilst the 'vast majority' of the particulates emitted from most waste incinerators will be of this size or smaller. These are the particles that can enter the human lung directly. (They also enter homes. Indoor air and outdoor air typically contain the same quantities of fine particles, so buildings provide no refuge.)

Most health studies have measured PM_{10} to assess effects. More studies are now tending to use $PM_{2.5}$, though the question of whether it is more predictive of harm than PM_{10} is still being debated (Anderson 2000). There is also evidence that short term effects from poor air quality is due to particle overloading. The number of studies that have used ultrafine particles ($PM_{0.1}$) is low, but there are indications that they are more hazardous than $PM_{2.5}$ (Wichmann & Peters 2000).

5.6 Number of Particles in Air

In a modern city or major town, on many days, the air will contain 100 billion (10^{11}) one-nanometer-diameter particles in each cubic meter of air, all of them invisible. By weight, these 100 billion particles will only amount to 0.00005 micrograms (one ten-thousandth of 1 percent of the 50-microgram legal limit), yet they may be responsible for much of the health damage created by fine-particle pollution.

5.7 Particle Size is Critical

For this reason, in 1979, the U.S. National Research Council said that measuring particles by weight, without regard to particle size, has "little utility for judging effects". Particle size is a vital consideration when it comes to air pollution and health. The study of fine particles and their effects on human health has been under way in earnest since 1975. During the past 20 years, studies have been able to rule out sulphur dioxide and ozone pollution as the cause of the observed deaths.

5.8 The mechanism of toxic action

In vivo studies performed on laboratory animals have looked at the ability of UFPs to produce inflammation in lungs after exposure to UFP aerosols (Donaldson 1999, Donaldson 2000, Donaldson 2001, Oberdörster 2000). The degree to which UFPs appear to be able to produce inflammation is related to the smallness of the particles, the 'age' of the aerosol and the level of previous exposure. It has been hypothesised (Seaton 1995) that the chronic inhalation of particles can set up a low grade inflammatory process that can damage the lining of the blood vessels, leading to arterial disease.

5.9 Fine Particles Linked to Human Deaths

A study of 552,138 adult Americans in 151 metropolitan areas confirmed once again that there is a clear relationship between fine-particle air pollution and human deaths, and it ruled out smoking as a cause of the observed deaths (Pope *et al.*, 1995; Villeneuve et al., 2002; Pope et al, 2002). This study is particularly important because it didn't simply match death certificates with pollution levels; it actually examined the characteristics (race, gender, weight and height) and lifestyle habits of all 552,138 people. Thus the study was able to rule out tobacco smoking (cigarettes, pipe and cigar); exposure to passive smoke; occupational exposure to fine particles; body mass index (relating to a person's weight and height); and alcohol use.

This study also controlled for changes in outdoor temperature. It found that fine-particle pollution was related to a 15% to 17% difference in death rates between the least polluted cities and the most-polluted cities. It should be noted that this research was vehemently attacked from a number of quarters, particularly those industries potentially most affected by the findings, which labelled it 'junk science' in an attempt to undermine the USEPA air pollution standards. However, an independent scientific panel has now "vindicated" the USEPA and confirmed that tiny soot particles can shorten lives, in a report published in July 2000. This work is supported by the recent findings that 6% of all deaths can be attributed to fine particle inhalation, (Kunzli et al, 2000).

5.10 Biological Mechanism for Cardio-Vascular and Diseases and Death

Researchers have shown previously that fine particles cause death and disease but the mechanism by which this occurs has remained a mystery. A novel hypothesis, published in the medical journal the Lancet (Seaton et al, 1995), suggests that the particles retained in the deep lung cause inflammation which, in turn, releases natural chemicals into the blood stream causing coagulation of the blood. This hypothesis was proposed as a biological mechanism by which fine particles cause respiratory and heart-related diseases and death. It has recently received supporting evidence from the work of Donaldson et al. (1999), who have demonstrated a persistent rise in blood coagulability in rats for up to 14 days following a single exposure to an aerosol of PM10 particles. This has been connected with epidemiological findings of increased cardiovascular disease in populations exposed to higher than average PM10 (particles of <10 μm) exposure (Dockery et al. 1993). The precise mechanism remains elusive but it appears that the classical toxicological approach of determining a dose-response curve is not appropriate. The data indicates that there is probably a low exposure threshold, above which the effects described above will occur. The main end point under investigation, with respect to environmental particulate exposure, is arterial damage, which is consistent with the known fact that smokers, who voluntarily inhale particulate aerosols, almost all sustain arterial damage themselves, as demonstrated by Auerbach et al. (1965).

6 Relevance of Particulate Aerosols to Incinerators.

6.1 Incinerators Emit Vast Quantities of Ultra-Fine Particles

Even the most modern waste incinerators emit an aerosol of ultrafine particles which current bag filter technology cannot abate. Ultrafine particle concentrations have been shown to be raised in the plume of a stationary combustion source, 350 metres downwind of the plant (Ping Shi et al, 2000). Collection efficiencies for particles < 2.5 μm are between 5 and 30% before the filters become coated with lime and activated carbon.

Particle size	Collection efficiency
PM10's	between 95% and 98%
PM 2.5's	between 65% and 70%
PM below 2.5	between 5% and 30%

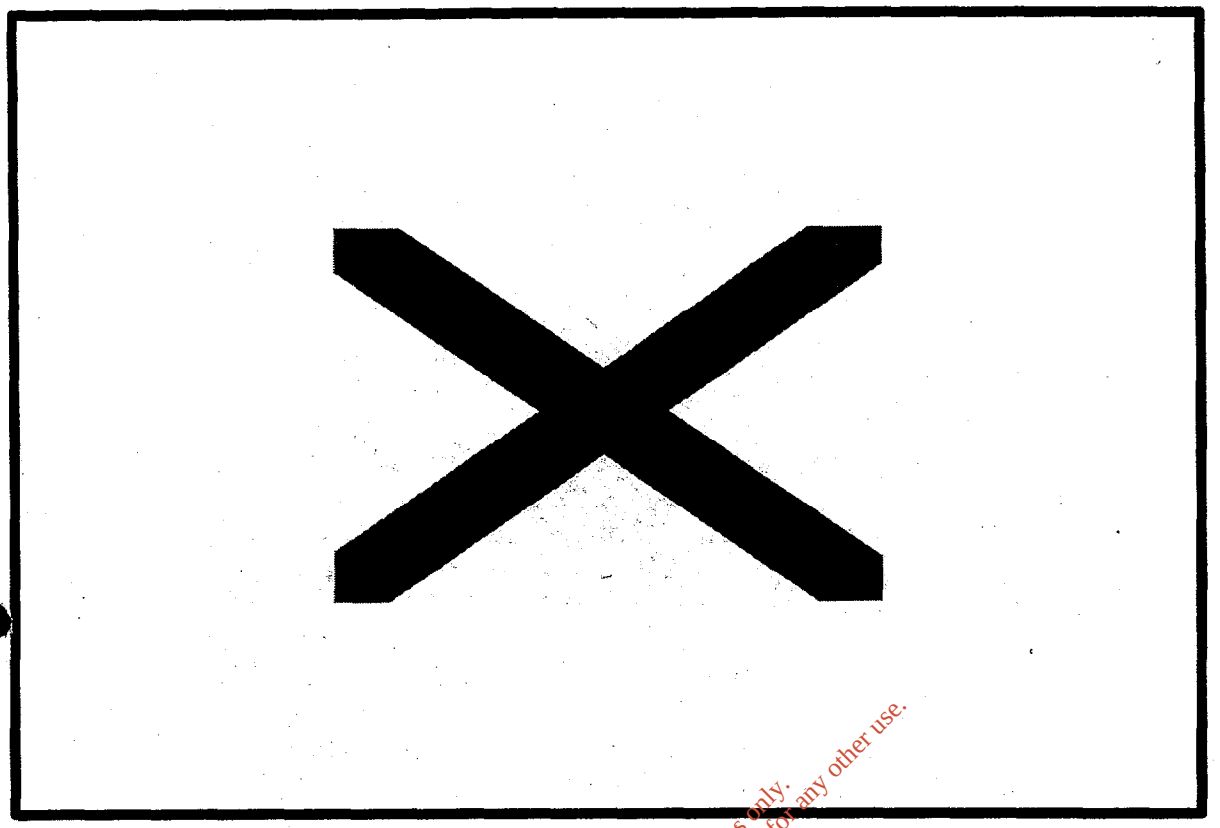
Table 3: Efficiency of baghouse filters for particles of differing sizes as claimed by operators. (From IPC Application by Onyx Hampshire September 1999)

It is known that the bag filter technology proposed for this plant is not really efficient at filtering very fine particles. For particles of less than 1 μm down to about 0.2 μm the abatement efficiency will be very low. Although very high capture rates, based on gravimetric indices, are claimed, it should be noted that on a number-weighted basis the majority of numbers of ultrafine particles will pass through and current standards do not take into consideration the sizes of the particles emitted by an incinerator. Thus these plants, which have very high gas fluxes, are guaranteed to produce an ultrafine particulate aerosol.

Not only will a high proportion of the ultra fine particles escape, but they will be chemically reactive and carry a wide range of products of incomplete combustion and adsorbed metals with them. The subsequent direct uptake of these respirable particles and the ready transfer from the lungs into the blood stream may be part of the reason that traditional toxicology is at a loss to explain the level of impacts for such apparently low exposures.

Particulate emissions from incinerators are characterised by the USEPA[2]:

[2] Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds Part I: Estimating Exposure to Dioxin-Like Compounds Volume 4: Site-Specific Assessment Procedures p 3-73 Draft Final EPA/600/P-00/001Ad March 2000



It can be seen that the smallest particles have the largest fraction of the surface area. Particle size is clearly a critical factor in the evaluation of the exposure/dose/risk relationship. The decay products associated with aerosols in the smallest size range (the ultra-fine) have much higher mobility in the air and can more effectively deposit in the respiratory system.

Ultrafine particles have been found to be chemically highly reactive, even when originating from a relatively unreactive bulk material (Jefferson & Tilley, 1999). The massive surface area associated with a small mass of nanometre-sized particles can act as a catalytic surface for the secondary formation of organic compounds such as the *de novo* synthesis of dioxins.

The relative toxicity of ultrafine particles arising from different processes remains un-researched. The levels of heavy and transitional metal inputs in hazardous waste are very much higher than with conventional wastes. Such increases must inevitably be associated with an increase in toxicity and consequently the likelihood of adverse health effects among the local receptors.

In my opinion, there is also a need to determine the relative toxicity of the particulate aerosols in the gases emitted by different waste disposal routes, to facilitate rational decisions as to the best disposal method, particularly with respect to public health. This should, in my opinion, be addressed urgently.

6.2 Data deficiencies in the Indaver submission with respect to assessing particle exposure of local receptors in upset conditions

The EIS only presents data on local particle concentrations in spring and summer months. A number of the measurements indicate that EU guideline levels are being breeched. There is no correlation between these high levels and the prevailing weather conditions. High levels of particulate pollution tend to occur in anti-cyclonic still air conditions, often associated with atmospheric inversions. I understand that such conditions are common for the area, particularly in winter, which has not been assessed in this EIS.

Should an excursion occur during such conditions, high levels of toxic particle pollution could be experienced by local receptors. The health sequelae outlined in the previous section would be of significance.

Under such circumstances factors such as the ability of the closest population in Cobh, numbering some 15,000, to mobilise and get off an island connected to the mainland by a single bridge appear to be a material consideration. In addition the closeness and ease of access of the emergency services are also of concern, as stated on page 82 of the WHO publication 'Site selection for new hazardous waste management facilities', WHO Regional Publications European Series No 46 (ISBN 92 890 1309 5).

PM 10 GRAPH in E.I.S.

7 Summary

Paragraph 14 of the EC Commission's Environmental Committee's draft report on the Commission White Paper on Strategy for a future Chemicals Policy(COM (2001) 88 – C5-0258/2001 – 2001/2118(COS)) makes the following statement:

> *"Considers that qualitative evaluations shall be taken as a sufficient basis for regulatory action, given the major uncertainties resulting from the enormous complexity of ecotoxicological effects and the innumerable sources of exposure;"*

This statement is of considerable significance in the consideration of health impacts from incinerators. The same White Paper in paragraph 18 states:

> *"Believes that effects on childrens' health shall be used as reference for human health risk assessments, given their enhanced sensitivity to chemical exposure;"*

This must be further considered in the light of the fact that the estimated dioxin outputs are generally an underestimate (De Fre & Wevers, 1998) and in addition they do not take account of many of the other compounds that would be generated which have dioxin-like activity. This includes brominated and chloro-brominated compounds. The evidence presented above makes it clear that in the general population, measurable adverse effects on the next generation are already occurring, which are attributable to dioxin-like substances.

The proposed incinerator also needs to be considered in the context of sustainability. It would have negative effects on sustainability in three ways:

- Firstly, it would add to the environmental burden of dioxin-like substances, metals and ultrafine particles. This legacy of persistent organic pollutants exists in all the effluvia of municipal solid waste incinerators, gets into the food chain and a significant proportion returns to human receptors.
- Secondly, it would lead to a reduced pressure to adopt policies higher up the waste hierarchy, such as waste minimisation and recycling.
- Thirdly, and of equal importance in the consideration of health effects, it would reduce pressure on the manufacturers of products containing toxic compounds (or their precursors e.g. in the case of dioxins, organo-chlorine compounds) to develop less toxic alternatives. This is because incineration gives the superficial impression that it offers a solution for the disposal of such products, with no adverse effects. However, experience has taught us that that is not the case and that a long-term toxic legacy is being left behind for future generations to have to deal with.

However, from what is known it is reasonable to predict that such aerosols would be among the more toxic. There is direct evidence that ultrafine particle concentrations are increased downwind of fixed combustion sources and this would be expected to have local health impacts, based on current knowledge.

On these grounds, it is my opinion that this application should be rejected because such a plant will have adverse health effects on the most sensitive human receptors and in view of the fact that there are alternative, less potentially harmful methods of treating waste, higher up the waste hierarchy.

Additionally, incineration should be regarded as a "fail NOT-safe" technology. The level of protection offered to the public requires the continuous and flawless functioning of complex engineering solutions,

working in extremely adverse conditions. Numerous experiences in the past with incineration technology inform us that this is simply not attainable. There are more environmentally benign and methods of dealing with waste which are "fail-safe", such as reduction, separation and recycling. Under the Precautionary Principle, these should be adopted in preference to other intrinsically more hazardous methods.

8 References

Air Quality Assessment – Technical Statement

Anderson HR (2000). 'Differential epidemiology of ambient aerosols.' *Phil. Trans. Roy. Soc. Lond.* **358**: 2771-2785.

Auerbach O, Cuyler Hammond E and Garfinkel L (1965). "Smoking in Relation to atherosclerosis of the coronary arteries." *New England J. Med.* 273: 775-779.

Axelrad, J.C., Howard, C.V. and McLean, W.G. (2002) 'Interactions between pesticides and components of pesticide formulations in an in vitro neurotoxicity test.' *Toxicology*, **173(3)**, 259-268.

Axelrad JC, Howard CV, McLean WG. (2003) 'The effects of acute pesticide exposure on neuroblastoma cells chronically exposed to diazinon.' *Toxicology*, **185**, 67-78.

Baccarelli, A., Mocarelli, P., Patterson, D.G. Jr., Bonzini, M., Pesatori, A.C., Caporaso, N. and Landi1, M.T. (2002). 'Immunologic Effects of Dioxin: New Results from Seveso and Comparison with Other Studies.' *Environmental Health Perspectives* **110**:1169-1173.

Birnbaum Linda (1998), "Sensitive Non-Carcinogenic Effects of TCDD in Animals". ". *Organohalogen Compounds* 38: 291-293

Boersma ER, Lanting CI. (2000) 'Environmental exposure to polychlorinated biphenyls (PCBs) and dioxins. Consequences for longterm neurological and cognitive development of the child lactation.' Adv *Exp Med Biol* **478**:271-87

Bridges JW (1992). *Consideration of possible impact on human health – Volume 1.* Proof of evidence to the Belvedere refuse to energy plant, September 1992, pp19-23.

Bridges JW (2003). *Evaluation of the health risks to the local population that may be associated with exposure to pollutants from the proposed Riverside Resousrce Recovery facility.* Proof of evidence to the Belvedere refuse to energy plant, June 2003 Document R-JWB 2, p24.

Chauhan AJ, Inskip HM, Linaker CH, Smith S, Schreiber J, Johnston SL, Holgate ST. (2003) Personal exposure to nitrogen dioxide (NO2) and the severity of virus-induced asthma in children. *Lancet.* **361(9373):** 1939-44.

COC (2000) Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC) *Cancer Incidence near municipal solid waste incinerators in Great Britain* Downloaded from http://www.doh.gov.uk/munipwst.htm

COT (2001) Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment. '*Statement on The Tolerable Daily Intake for Dioxins and Dioxin-Like Polychlorinated Biphenyls.*' COT/2001/07 October 2001. Available on http://www.food.gov.uk/multimedia/pdfs/cot-diox-full

de Fre R & Wevers M (1998). Underestimation of dioxin emission inventories. *Organohalogen Compounds* Vol 36: pp 17-20

Dockery DW, Pope C A, Xu XP, Spengler JD, Ware JH, Fay ME, Ferris BG and Speizer FE (1993). "An association between air-pollution and mortality in 6 United -States cities." *New England J. Med.* 329:1753-1759.

Donaldson J, Stone V & MacNee W (1999). "The toxicology of ultrafine particles." In: *Particulate matter: properties and effects upon health.* (Eds Maynard R L & Howard C V), 1999, BIOS Scientific Publishers Ltd, Oxford (ISBN 1 85996 172 X) pp115-129.

Donaldson K, Stone V, Gilmour PS, Brown DM and MacNee W (2000). 'Ultrafine particles: mechanisms of lung injury.' *Phil. Trans. Roy. Soc. Lond.* **358**: 2741-2749.

Donaldson K., Stone V., Clouter A., Renwick L. and MacNee W. (2001). 'Ultrafine Particles', *Occup Environ Med* **58:** 211–216

Dummer TJB, Dickinson HO, Parker L (2003) 'Adverse pregnancy outcomes around incinerators and crematoriums in Cumbria, north west England, 1956–93' *J Epidemiol Community Health* **57**: 456–461

Elliott P, Shaddick G, Kleinschmidt I, Jolley D, Walls P, Beresford J, Grundy C (1996) Cancer incidence near municipal solid waste incinerators in Great Britain. Small Area Health Statistics Unit, Department of Public Health and Policy, London School of Hygiene and Tropical Medicine, UK. Br J Cancer 1996 Mar;73(5):702-10

Elliot P, Eaton N, Shaddick G and Carter R (2000). Cancer Incidence near Municipal Solid Waste Incinerators in Great Britain 2 : Histopathological and Case Note Review of primary liver cancer cases. Br JCancer, 82(5) p1103-1106.

Environment, Transport and Regional Affairs Committee's Fifth Report on Delivering Sustainable Waste Management HC36-I 21st March 2001

Freudenburg WR, Rursch JA (1994) The risks of "Putting the numbers in context": a cautionary tale. University of Wisconsin-Madison 53706. Risk Anal 1994 Dec;14(6):949-58

Gray, L.E. Jr, Kelce, W.R., Monosson, E., Ostby, J.S. and Birnbaum, L. (1995) 'Exposure to TCDD during development permanently alters reproductive function in male Long Evans rats and hamsters: reduced ejaculated and epididymal sperm numbers and sex accessory gland weights in offspring with normal androgenic status.', *Toxicol Appl Pharmacol.* **131(1)**:108-118.

Gumbleton M (2001) 'Caveolae as potential macromolecule trafficking compartments within alveolar epithelium', *Advanced Drug Delivery Reviews* **49** : 281–300

Hansard 14 Nov 2000 : Column: 579W

Hardell L, van Bavel B, Lindström G, Carlberg M, Dreifaldt AC, Wijkström H, Starkhammar H, Eriksson M, Hallquist A, Kolmert T. (2003) 'Increased Concentrations of Polychlorinated Biphenyls, Hexachlorobenzene and Chlordanes in Mothers to Men with Testicular Cancer.' *Environ Health Perspect.* **111(7)**: 930-4.

Hooper K, She J (2003) Lessons from the polybrominated diphenyl ethers (PBDEs): precautionary principle, primary prevention, and the value of community-based body-burden monitoring using breast milk. *Environ Health Perspect.* **111(1)**: 109-14.

Howard, C.V. (1997) 'Synergistic effects of chemical mixtures - Can we rely on traditional toxicology?', *The Ecologist* **27(5),** 192-195.

Howard C V (1999). Foreword to *Particulate matter: properties and effects upon health.* (Eds Maynard R L & Howard C V), BIOS Scientific Publishers Ltd, Oxford (ISBN 1 85996 172 X)

Howard C V (2000). "Particulate aerosols, incinerators and health" In: *Health Impacts of Waste Management Policies.* (Eds: Nicolopoulou-Stamati P, Hens L and Howard CV), Kluwer Academic Publishers, Dordrecht, (ISBN 0-7923-6362-0), pp155-174.

Howard C V, Staats de Yanes G & Nicolopoulou-Stamati P (2000). "Persistent organic chemical pollution: an introduction" In: *Health Impacts of Waste Management Policies.* (Eds: Nicolopoulou-Stamati P, Hens L and Howard CV), Kluwer Academic Publishers, Dordrecht, (ISBN 0-7923-6362-0), pp 29-40.

Howard C V & Staats de Yanes G (2001). "Endocrine disrupting chemicals: a conceptual framework" In: *Endocrine Disrupters: Environmental Health and Policies.* (Eds : Nicolopoulou-Stamati P, Hens L and Howard CV), Kluwer Academic Publishers, Dordrecht (ISBN 0-7923-7056-2). pp 219-250.

Howard C.V. (2003) Nano-particles and Toxicity. Annex (p15-20) in *No Small Matter II: The Case for a Global Moratorium Size Matters!* ETC Group Occasional Paper Series **7:1** April 2003. Available on ETC Group website at http://www.etcgroup.org/documents/Occ.Paper_Nanosafety.pdf

Huisman, M., Koopman-Esseboom, C., Lanting, C.I., van der Paauw, C.G., Th. Tuinstra, L.G.M., Fidler, V., Weisglas-Kuperus, N., Sauer, P.J.J., Boersma, E.R. and Towen, B.C.L. (1996). 'Neurological condition in 18-month-old children perinatally exposed to polychlorinated biphenyls and dioxins.' *Early Human Development* **43**: 165-176.

Jay K and L. Steiglitz (1995) "Identification and Quantification of Volatile Organic Components in Emissions of Waste Incineration Plants," CHEMOSPHERE Vol. 30, No. 7 (1995), pgs. 1249-1260.

Jefferson D A & Tilley E E M (1999). "The structural and physical chemistry of nanoparticles." In: *Particulate matter: properties and effects upon health* (Eds Maynard R L & Howard C V). BIOS Scientific Publishers Ltd, Oxford (ISBN 1 85996 172 X) pp 63-84.

Johnson BL. (1994) "Health Impacts of Incineration - Part II", Congressional Testimony by Barry L. Johnson, Ph.D. Assistant Surgeon General, Assistant Administrator, Agency for Toxic Substances and Disease Registry, Public Health Service, U. S. Department of Health and Human Services Before the Subcommittee on Human Resources and Intergovernmental Relations Committee on Government Operations United States House of Representatives July 8, 1994

Knox E (2000) "Childhood cancers, birthplaces, incinerators and landfill sites." Int J Epidemiol 2000 Jun;29(3):391-397

Knox EG, Gilman EA (1998) "Migration patterns of children with cancer in Britain." Department of Public Health and Epidemiology, Medical School, University of Birmingham. J Epidemiol Community Health 1998 Nov;52(11):716-26

Koopman-Esseboom, C., Weisglas-Kuperus, N., de Ridder, M.A.J., van der Paauw, C.G., Th Tuinstra L.G.M., and Sauer P.J.J. (1996). 'Effects of Polychlorinated Biphenyl/Dioxin Exposure and Feeding Type on Infants' Mental and Psychomotor Development.' *Pediatrics* **97(5)**: pgs. 700-706.

Koppe JG, Ten Tusscher G and de Boer P. (2000) "Background exposure to dioxins and PCB's in Europe and the resulting health effects." In: *Health Impacts of Waste Management Policies*. (Eds: Nicolopoulou-Stamati P, Hens L and Howard CV), Kluwer Academic Publishers, Dordrecht, (ISBN 0-7923-6362-0), pp135-154.

Koppe, J., and De Boer, P. (2001) 'Immunotoxicity by dioxins and PCBs in the perinatal period' in P. Nicolopoulou-Stamati, L. Hens, and C.V. Howard (eds), *Endocrine Disrupters: Environmental Health and Policies*, Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 69-80

Kreyling WG, Semmler M, Erbe F, Mayer P, Takenaka S, Schulz H, Oberdörster G,and Ziesenis A. (2002) 'Translocation of ultrafine insoluble iridium particles from lung epithelium to extrapulmonary organs is size dependent but very low.' *J Toxicol Environ Health A*. Oct 25; **65(20)**: 1513-1530.

Künzli N, IB Tager, U Ackerman Liebrich. (1996) "Issues of methodology: the epidemiological assessment of long-term effects of recurrent oxidant exposure." In Health Effects of ozone and nitrogen oxides in an integrated assessment of air pollution. UNECE/WHO Proceedings of an international workshop June 1996 p89

Kunzli N, Kaiser R, Medina S et. al. (2000). "Public-health impact of outdoor and traffic-related air pollution: a European assessment". Lancet 356: 795-801.

Lang, L. (1995) 'Strange brew: assessing risk of chemical mixtures', *Environ. Health Perspect.* **103**, 142-145.

Lanting, C.I. (1999) '*Effects of Perinatal PCB and Dioxin Exposure and Early Feeding Mode on Child Development*', PhD Thesis, Printpartners Ipskamp B.V., Enschede, the Netherlands, ISBN 90-367-1002-2.

Mackie, D., Liu, J., Loh, Y. and Thomas V. (2003) 'No Evidence of Dioxin Cancer Threshold' *Environ Health Perspect* **111(7):** 1145-1147.

Mocarelli P, Gerthoux PM, Ferrari E, Patterson G, Kieszak SM, Brambilla P, Vincoli N, Signorini S, Tramacere P, Carreri V, Sampson EJ, Turner WE and Needham LL (2000). 'Paternal concentrations of dioxin and sex ratio of offspring'. *The Lancet*, May 27, 2000, 355: 1858-1863.

National Research Council, National Academy of Sciences, "Airborne Particles" (Baltimore, Md: University Park Press, 1979), pp. 108, 110.

Oberdorster G. (2000). 'Toxicology of ultrafine particles: *in vivo* studies.' *Phil. Trans. R. Soc. Lond.* **358**: 2719-2740.

Oberdorster G, Sharp Z, Atudorei V, Elder A, Gelein R, Lunts A, Kreyling W, and Cox C. (2002) 'Extrapulmonary translocation of ultrafine carbon particles following whole-body inhalation exposure of rats.' *J Toxicol Environ Health A*. Oct 25; **65(20)**: 1531-43

Ohtake F, Takeyama K, Matsumoto T, Kitagawa H, Yamamoto Y, Nohara K, Tohyama C, Krust A, Mimura J, Chambon P, Yanagisawa J, Fujii-Kuriyama Y, Kato S. (2003). 'Modulation of oestrogen receptor signalling by association with the activated dioxin receptor.' *Nature*. **423(6939):** 545-50.

Patandin, S., Lanting, C.I., Mulder, P.G., Boersma, E.R., Sauer, P.J., Weisglas-Kuperus N. (1999). 'Effects of environmental exposure to polychlorinated biphenyls and dioxins on cognitive abilities in Dutch children at 42 months of age.' *J Pediatr.* **134(1)**:33-41.

Pope CA III, Bates DV, and Raizenne ME (1995), "Health Effects of Particulate Air Pollution: Time for Reassessment?" *Environmental Health Perspectives*, **103(5):** 472-480

Pope CA 3rd, Burnett RT, Thun MJ, Calle EE, Krewski D, Ito K, Thurston GD. (2002) 'Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution.' *JAMA*. **287(9):** 1132-41.

Royal Commission on Environmental Pollution (2003) Twenty-fourth Report '*Chemicals in Products. Safeguarding the Environment and Human Health.*' Downloaded June 2003 from http://www.rcep.org.uk/chreport.html

REIA p 17 and Appendix 2

Seaton A et al (1995) "Particulate air pollution and acute health effects," *The Lancet* Vol. 345 (January 21, 1995), pp 176-178.

Sixma JJ. (1996) Letter of August 6, 1996 to the Dutch Minister of Health, presenting the report of the Health Council of the Netherlands dioxin assessment, entitled *Dioxins. Polychlorinated dibenzo-p-dioxins, dibenzofurans and dioxin-like polychlorinated biphenyls*.

Skaare JU, Polder A. (1990) 'Polychlorinated biphenyls and organochlorine pesticides in milk of Norwegian women during lactation.' Arch Environ Contam Toxicol. 19(5):640-5.

~~Skakkebaek, N.E., Rajpert-de Meyts, E. and Main, K.M. (2001), 'Testicular dysgenesis syndrome: an increasingly common developmental disorder with environmental aspects', *Human Reproduction*, **16**(5): 972-978~~

Soto, A.M., Fernandez, M.F., Luizzi, M.F., Oles Karasko, A.S. and Sonnenschein, C. (1997) 'Developing a marker of exposure to xenoestrogen mixtures in human serum.' *Environmental Health Perspectives* **105**, 647-654

Staessen JA, Tim Nawrot, Elly Den Hond, Lutgarde Thijs, Robert Fagard, Karel Hoppenbrouwers, Gudrun Koppen, Vera Nelen, Greet Schoeters, Dirk Vanderschueren, Etienne Van Hecke, Luc Verschaeve, Robert Vlietinck, Harry A Roels (2001) "Renal function, cytogenetic measurements, and sexual development in adolescents in relation to environmental pollutants: a feasibility study of biomarkers", for the Environment and Health Study Group* Lancet 357: 1660–69

Suh-Woan Hu Carl M. Shy J. (2001) "Health Effects of Waste Incineration: A Review of Epidemiologic Studies" Air & Waste Manage. Assoc. 51:1100-1109 Copyright 2001 Air & Waste Management Association ISSN 1047-3289

ten Tusscher, G. (2002) '*Later childhood effects of perinatal exposure to background levels of dioxins in The Netherlands*', PhD Thesis, University of Amsterdam, ISBN: 90-9016271-2

Toppari, J., Larsen, J.C., Christiansen, P., Giwercman, A., Grandjean, P., Guillette, L.J., Jr., Jegou, B., Jensen, T.K., Jouannet, P., Keidig, N., Leffers, H., McLachlan, J.A., Meyer, O., Muller, J., Rajpert-De Meyts, E., Scheike, T., Sharbe, R., Sumpter, J., and Skakkebaek, N.E. (1996) 'Male reproductive health and environmental chemical xenoestrogen', *Environ. Health Perspect.* **104(4)**, 741-803.

U.S.E.P.A. (2000). "Information Sheet 1. Dioxin: Summary of the Dioxin Reassessment Science", USEPA, June 12, 2000.

U.S. Environmental Protection Agency, (2000). "Information Sheet 2. Dioxin: Scientific Highlights from Draft Reassessment (2000)", USEPA, June 12, 2000.

van Leeuwen FXR and Younes M (1998) 'WHO revises the Tolerable Daily Intake (TDI) for dioxins', *Organohalogen Compounds* **38**: 295-298

Villeneuve PJ, Goldberg MS, Krewski D, Burnett RT, Chen Y. (2002) 'Fine particulate air pollution and all-cause mortality within the Harvard Six-Cities Study: variations in risk by period of exposure.' *Ann Epidemiol.* **12(8):**568-76.

vom Saal, F., Montano, M., and Wang, M. (1992). 'Sexual Differentiation in Mammals.' pp 17-83 in T Colborn and C Clement (eds), *Chemically-Induced Alterations in Sexual and Functional Development: The Wildlife/Human Connection*, Princeton Scientific Publishing Co., NJ.

Vreugdenhil, H.J., Slijper, F.M., Mulder, P.G., Weisglas-Kuperus, N. (2002) 'Effects of Perinatal Exposure to PCBs and Dioxins on Play Behavior in Dutch Children at School Age.' *Environ Health Perspect.*; **110(10)**: A593-8

Weisglas-Kuperus, N., Patandin, S., Berbers, G.A., Sas, T.C., Mulder, P.G., Sauer, P.J., Hooijkaas, H. (2000) 'Immunologic effects of background exposure to polychlorinated biphenyls and dioxins in Dutch preschool children.' *Environ Health Perspect.* **108(12):**1203-7.

Wichmann, H.E., and Peters, A. (2000). 'Epidemiological evidence of the effect of ultrafine particle exposure.' *Phil. Trans. Roy.. Soc. Lond.* **358**: 2751-2769.

Williams FLR, Lawson AB and Lloyd OL (1992). 'Low Sex Ratios of Births in Areas at Risk from Air Pollution from Incinerators, as Shown by Geographical Analysis and 3-Dimensional Mapping.' International Journal of Epidemiology, 21:2 311-319.

WHO Guidelines for air quality. (2000)