

**ORAL HEARING INTO
PROPOSED DECISION 167-1
CARRANSTOWN WASTE MANAGEMENT FACILITY**

PROOF OF EVIDENCE

UNESCO World Heritage Site

Jackie Keaney

INDAVER IRELAND

*For inspection purposes only.
Consent of copyright owner required for any other use.*

Jackie Keaney will say:

1. Qualifications & Experience

My name is Jackie Keaney and I am a Project Manager with Indaver Ireland. I hold a Degree in Environmental Science from University College Dublin and a Masters of Environmental Studies from Trinity College Dublin. I also hold a Diploma in Public Relations from the Fitzwilliam Institute, Dublin and I am a member of the Public Relations Institute of Ireland.

I have worked on Indaver Ireland infrastructural projects since 1999. I developed and continue to maintain the company's communications programme for each project.

2. Introduction

I wish to describe Indaver's communications with UNESCO regarding the World Heritage Site of the Bends of the Boyne.

The United Nations Educational, Scientific and Cultural Organization (UNESCO), through the World Heritage Convention¹, seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity.

UNESCO's World Heritage mission is to encourage States Parties to the Convention to nominate sites within their national territory for inclusion on the World Heritage List and establish management plans and set up reporting systems on the state of conservation of their World Heritage sites. UNESCO's mission is also to safeguard World Heritage properties by providing technical assistance and professional training and providing emergency assistance for World Heritage sites in immediate danger. It also supports States Parties' public awareness-building activities to encourage participation of the local population in the preservation of their cultural and natural heritage.

3. Meeting with UNESCO

Indaver Ireland met with two delegates from UNESCO while they were on a three-day Mission of the Bends of the Boyne to investigate any likely impact of the proposed incinerator in Carranstown on the World Heritage site in February 2004.

A meeting was held in the Boyne Valley hotel to discuss the details of Indaver's proposed facility for Carranstown. Indaver representatives outlined Irish Waste Policy, the Regional Waste Management Plans, the type of waste management technology proposed for the facility and the company's experience of running similar facilities in Flanders, Belgium.

The delegation was shown the plant model of the facility and photomontages from a number of locations to illustrate how the facility would not visually impact on Bru na Boinne. Mr Eoin Halpin, Archaeologist on behalf of Indaver Ireland, gave details on the archaeology of the area and the Department of the Environment, Heritage and

Local Government Bru na Boinne Management Plan. Mr Halpin outlined the Core Area which includes the main Neolithic sites of Bru na Boinne and the Department's designation of a Buffer Zone around this Core Area in order to protect the World Heritage Site.

It was outlined that the proposed site is located 1.5km outside this Buffer Zone.

The delegation visited the site and viewed the site locations of their choice. They chose to view the site from the following locations:

- Reservoir on Red Mountain 2 km from the site
- Bru na Boinne 6.5km from the site
- Dowth 4.5 km from the site

During the site visit the following facts were highlighted to the delegation:

The site of the proposed facility is 8km by road, and 6km as the crow flies, from Bru na Boinne. A railway line, a large quarry, Red Mountain and the River Boyne all separate the site from Bru na Boinne.

The Prevailing winds are primarily in North Easterly direction. Therefore air emissions from the Carranstown facility would not blow in the direction of Bru na Boinne.

The Carranstown facility would not have a visual impact on Bru na Boinne due to high ground to the north-west of the site, i.e. Red Mountain. The facility would not be visible from Bru na Boinne located 6.5km away or Dowth located 4.5 km away.

The delegation queried whether the plume from the stack would be visible from the World Heritage site. Indaver confirmed that the incineration process would be designed to include mitigation measures which would eliminate a visible plume except under certain weather conditions, such as a damp, foggy day.

The delegation also requested clarification as to whether air emissions from the proposed facility would impact on the stonework of the World Heritage site. Indaver appointed Awn Consulting to assess this and a report was submitted to UNESCO in March 2005 prior to preparation of the final report.

4. Proposed Stack Height

Subsequent to this meeting Indaver was informed that the EPA proposed to increase the height of the stack from 40m to 65m (95.3m OD). Additional information, including photomontages which took into account the Agency's proposed stack height, was prepared and submitted to the UNESCO delegation prior to its report of the Mission.

as per
Jackie
Keaney
presentation
10/3/05 file

For assessment purposes only. Not for use.
Copyright reserved for assessment purposes only.

5. UNESCO Report

The UNESCO delegation published a report of its findings subsequent to its visit of the Bends of the Boyne in July 2004.

The main findings of the report were as follows:

1. Direct possible impacts: The application site was subject to an archaeological assessment which concluded that there was no evidence for the existence of any archaeological material on the site and certainly nothing to suggest any cultural remains from the megalithic period. It was concluded that on the basis of this assessment the mission felt that there are no grounds for believing that the construction of the proposed incinerator itself would have a direct impact on the outstanding universal value of the World Heritage site and that any effect on possible archaeological sites of local significance within the application area would be mitigated by archaeological monitoring.

Regarding the Battle of the Boyne site within the buffer zone, the Mission concluded that the construction of the incinerator would not appear to preclude any possible interpretation of the course of the Battle.

2. Visual impacts: While the construction of the incinerator stack will be a visual intrusion, the mission considers that it would have a minimum impact on the World Heritage site.

3. Possible impacts of polluting emissions: The mission was concerned to understand whether or not emissions from the proposed incinerator could cause possible damage and is seeking scientific advice from appropriate experts, including ICOMOS Ireland and the International Council of Scientific Union (ICSU). According to the assessment by AWN Consulting Ltd, on behalf of the applicant, the emission of pollutant such as SO₂ and NO_x are well within the regulatory limit set by the EU and other European Bodies. The report further comments that there are no defined standards relating to the effects of ambient air pollutants on stonework or historical monuments. The mission recommends that the Office of Public Works develops a methodology for monitoring the state of conservation of the World Heritage site, particularly the effect of the ambient air pollutant on stonework or historical monuments.

The conclusion of the report was as follows:

"Having visited the site and examined all the available planning documents as well as the different viewpoints expressed by the stakeholders, the mission has come to the opinion that the current application will not have a major effect on the outstanding universal value and the visual integrity of the Archaeological Ensemble of the Bend of the Boyne.

TECHNICAL REPORT

**ASSESSMENT OF AIR QUALITY IMPACT OF
CARRANSTOWN WASTE MANAGEMENT FACILITY AT
BRU NA BOINNE**

FOR

**Indaver Ireland
4 Haddington Terrace
Dun Laoghaire
Co. Dublin**

Consent of the EPA is required for any other use.

Report prepared by: Dr. Eoin Collins, Environmental Consultant
Our reference: EC/04/2069AR01_1
Date: 9 March 2004

EXECUTIVE SUMMARY

AWN Consulting Ltd previously assessed the Air Quality impact of the Carranstown Waste Management facility as part of the site's Waste Licence Application. In the current assessment the impact of the emissions from the proposed Carranstown Waste Management Facility on the Brú na Boinne World Heritage Site has been carried out.

The United States Environmental Protection Agency (USEPA) approved ISCST3 dispersion model has been used to predict the ground level concentrations (GLC) at Brú na Boinne resulting from compounds emitted from Carranstown Waste Management Facility.

Modelling results for the facility indicate that the ambient ground level concentrations at Brú na Boinne resulting from the Waste Management Facility are significantly below the relevant air quality standards for all species. The results for NO₂ indicate that levels at Brú na Boinne reach only 6% of the limit value. With regard to SO₂, the predicted levels at Brú na Boinne will reach at most 3% of the limit value, and for all other species modelled, the predicted levels at Brú na Boinne will reach 0.01 - 8.3% of their respective limit values.

Levels of all species are significantly lower than the Human and Ecosystem Standards set by the EU and other European bodies. Thus, the impact air emissions from the Carranstown Waste Management Facility at Brú na Boinne will be insignificant.

Although there are no specific EU standards relating to the maximum levels of ambient air pollutants on stonework or historical monuments, the focus has been on reducing the emissions of the precursors to acid rain such as NO_x, SO₂ and VOCs. The 1999 Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution, is one such agreement which has set stringent emissions ceilings for NO_x, SO₂ (emissions of SO₂ and NO_x will be reduced by 76% and 43% compared to 1990 levels by 2010). This Protocol has recently been passed into Irish legislation as S.I. No. 10 of 2004. To put the current facility in context, emissions of NO_x, SO₂ and VOCs from Carranstown Waste Management Facility will reach at most 0.4% of their National Emissions Ceilings in 2010.

Cumulatively, results indicate that levels at Brú na Boinne will be below the relevant limit values under all scenarios. The effect of raising the Carranstown Waste Management Facility stack to 65m will be insignificant and will not materially affect the cumulative results.

CONTENTS

EXECUTIVE SUMMARY

- 1.0 INTRODUCTION
- 2.0 STUDY METHODOLOGY
- 3.0 BASELINE AIR QUALITY REVIEW
- 4.0 MODELLING METHODOLOGY
- 5.0 MODELLING RESULTS
- 6.0 CONCLUSION

Tables 1-0

*For inspection purposes only.
Consent of copyright owner required for any other use.*

1.0 INTRODUCTION

AWN Consulting Ltd has been commissioned to carry out an air dispersion modelling study of the impact of emissions from the proposed Carranstown Waste Management Facility on the Brú na Boinne World Heritage Site. AWN Consulting assessed the air quality impact for the Carranstown Waste Management Licence, and have extensive experience in the area of air modelling and the preparation of air dispersion modelling reports for Environmental Impact Statements and IPC Licences. AWN Consulting have also been involved in many other large scale projects, some of which are detailed below.

- **Ringaskiddy Waste-to-Energy Plant** – 3-month baseline survey including heavy metals and dioxins and air dispersion & deposition modelling using ISCST3 and AERMOD.
- **Intel Ireland IPC Licence Review** – air dispersion modelling for FAB24 using AERMOD-PRIME.
- **Analog Devices IPC Licence Review** – air dispersion modelling for site expansion using AERMOD.
- **Alza EIS** –baseline air quality survey and air dispersion modelling for the proposed site using AERMOD and CAL3QHCR air dispersion models.
- **N3 Clonee To North of Kells EIS** – baseline survey and air modelling using Cal3QHCR.
- **South Dublin Outer Ring Road EIS** – baseline survey and air modelling using Cal3QHCR.
- **2nd Liffey Valley Bridge EIS** – extensive baseline air quality for the proposed bridge.

2.0 STUDY METHODOLOGY

Ambient Air Quality Standards

The relevant air quality standards in Ireland relating to human health and ecosystems are based on Council Directives 1999/30/EC and 2000/69/EC (transposed in Irish Law as S.I. 271 of 2002). The directives, as relating to limit values for nitrogen dioxide, sulphur dioxide, and PM₁₀ are detailed in Table 1.1. The directives also details margins of tolerance in the period leading to the attainment date. The margin of tolerance started to reduce from 1 January 2001 and will reduce every 12 months thereafter by equal annual percentages to reach 0% by the attainment date. The attainment date varies from between 2005 and 2010 depending on the pollutant concerned. Air quality standards for the remaining pollutants relevant to this study are detailed in Tables 1.3-1.5.

There are no defined EU standards relating to the effects of ambient air pollutants on stonework or historical monuments. Nevertheless, in response to the international problem of the effect of certain pollutants (including acidification), the 1999 Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution⁽¹⁾, has set emissions ceilings for NO_x, SO₂ and VOCs. National Emissions Ceilings for Ireland have recently been passed into Irish legislation as S.I. No. 10 of 2004 (Table 1.2).

Assessment Methodology

The air dispersion modelling input data consisted of information on the physical environment (including building dimensions and terrain features), design details from

all emission points on-site and a full year of appropriate meteorological data. Using this input data the model predicted ambient ground level concentrations in the region of Brú na Boinne for each hour of the modelled meteorological year. The model post-processed the data to identify the location and maximum of the worst-case ground level concentration. This worst-case concentration was then added to the background concentration to give the worst-case predicted environmental concentration (PEC). The PEC was then compared with the relevant ambient air quality standard to assess the significance of the releases from the site.

Throughout this study a worst-case approach was taken. This will most likely lead to an over-estimation of the levels that will arise in practice. The worst-case assumptions are outlined below:

- Emissions from all emission points were assumed to be operating at their maximum emission level, 24 hours/day over the course of a full year.
- Maximum predicted concentrations were reported in this study.
- Worst-case site-specific background concentrations were used to assess the baseline levels of substances released from the site
- The effects of building downwash, due to on-site and any nearby off-site buildings, has been included in the model.
- A cumulative assessment of the relevant emissions from Marathon Power and Irish Cement Ltd. have also been carried out.

The study consists of the following components:

- Dispersion modelling of process releases using the most appropriate meteorological data
- Presentation of concentrations of process released substances at the maximum location at / near the Brú na Boinne site
- Evaluation of the significance of the concentrations by comparison with air quality standards and guidelines.

Modelling and a subsequent impact assessment at Brú na Boinne was undertaken for the following substances released from the site:

- Nitrogen dioxide (NO₂) and Nitrogen Oxide (NO)
- Sulphur Dioxide (SO₂)
- Total Dust (as PM₁₀)
- Gaseous and vaporous organic substances expressed as total organic carbon (TOC)
- Hydrogen Chloride (HCl)
- Hydrogen Fluoride (HF)
- PCDD/PCDFs (Dioxins)
- Mercury (Hg)
- Cadmium (Cd) and Thallium (Tl)
- Sum of Antimony (Sb), Arsenic (As), Lead (Pb), Chromium (Cr), Cobalt (Co), Copper (Cu), Manganese (Mn), Nickel (Ni) and Vanadium (V).

3.0 BASELINE AIR QUALITY REVIEW

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. Local Authority data is however available near the current scheme for SO₂ and smoke. Data for Drogheda in 2001/02 lists mean SO₂ and smoke levels of 24 and 28 µg/m³ respectively⁽²⁾.

The recent publication "Air Quality Monitoring Report 2002" (EPA, 2004)⁽²⁾ details recent long-term mobile monitoring surveys in Drogheda. Drogheda is classified as a Zone C air quality management area (i.e. an urban area with a population less than 15,000). Brú na Boinne is classified as Zone D (rural) and would be expected to experience pollutant levels lower than those in Drogheda

NO₂ levels in Drogheda were low over the monitoring period, with an annual average of 23 µg/m³⁽²⁾ with no exceedences of the 1-hour limit value. In relation to PM₁₀, the annual average was 32 µg/m³⁽²⁾, with 11 exceedences of the 24-hour limit value. Benzene averaged 1.3 µg/m³ over the survey period whilst levels of CO were also low averaging 0.33 mg/m³.

4.0 MODELLING METHODOLOGY

The United States Environmental Protection Agency (USEPA) approved ISCST3 dispersion model has been used to predict the ground level concentrations (GLC) at Brú na Boinne resulting from compounds emitted from the principal emission sources on-site.

The modelling incorporated the following features:

- A receptor grid was identified at which concentrations would be modelled. The grid, which covered an area of 11 km², extended from the townland of Rosnaree to that of Proudfootstown. Concentrations were calculated at 500m intervals on the grid. In addition, individual receptors within this grid were located at the Knowth, Newgrange and Dowth megalithic tombs.
- All on-site and nearby offsite buildings and significant process structures were mapped into the computer to create a three dimensional visualisation of the site and its emission points. Buildings and process structures can influence the passage of airflow over the emission stacks and draw plumes down towards the ground (termed building downwash). The stacks themselves can influence airflow in the same way as buildings by causing low-pressure regions behind them (termed stack tip downwash). Both building and stack tip downwash were incorporated into the modelling. Additionally, all significant structures off-site were incorporated into the model as they may effect dispersion of the plume in the immediate vicinity of the site.
- Hourly-sequenced meteorological information. The most important parameters governing dispersion in the atmosphere are wind speed, wind-direction and the stability or turbulence of the atmosphere. These parameters along with the ambient temperature and inferred mixing heights for each hour during 1994 (worst-case year from 1993 – 1998 in the original assessment) from Dublin Airport Meteorological Station were included in the modelling.

- **Source information.** The source and emission data, including stack dimensions, gas volumes and emission temperatures have been incorporated into the model. Modelling has been carried out at stack heights of 40m and 65m.
- Terrain has been included in the modelling. The surrounding area has significant changes in terrain and these have been mapped out in detail using data supplied by Ordnance Survey Ireland.

Details of the emission points and input parameters used in the dispersion model are shown in Tables 1.7-1.9. Emission data for the model was taken from design information supplied by the design engineers for the Indaver stack. In addition, stack details for Irish Cement, Platin and Marathon Power were sourced from relevant IPC licences and Environmental Impact Statements. The dispersion modelling results are outlined in the Table 1.10. For all averaging periods and pollutants, the process contribution is the maximum concentration predicted in the region of Brú na Boinne.

In order to determine the predicted ground level concentration (GLC), the modelled concentration of pollutants from the site was combined with the background concentration (see Table 1.6). In relation to the annual averages, the background concentration was added directly to the process contribution. However, in relation to the short-term peak concentrations, concentrations due to emissions from elevated sources cannot be combined in the same way. Guidance from the UK Environment Agency⁽³⁾ advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum short-term concentration due to emissions from the source to twice the annual mean baseline concentration.

Nitrogen dioxide was modelled following the approach outlined by the USEPA⁽⁴⁻⁶⁾ for assessing the impact of NO_x from point sources. The approach involves assessing the air quality impact through a three tiered screening technique. The Tier 2 approach, with a site-specific NO_x to NO₂ ratio of 0.75, was used to convert predicted annual NO_x concentrations. The Tier 3 approach, with a site-specific NO_x to NO₂ ratio of 0.3, was used to convert predicted hourly NO_x concentrations.

5.0 MODELLING RESULTS

Background Concentrations

The ambient concentrations detailed in the following sections include both the emissions from the site and the ambient background concentration for that substance. Background concentrations have been derived from a worst-case analysis of the cumulative sources in the region in the absence of the development (Table 1.6). The method for derivation of these background concentrations is detailed in the Carranstown Waste Management Licence Application.

Assessment Summary

The air dispersion modelling impact assessment at Brú na Boinne resulting from the proposed Waste Management Facility at Carranstown is outlined below. Details of the maximum ambient ground level concentrations are given in Table 1.10 and are compared with the relevant ambient air quality standards. The predicted emission concentration incorporates worst-case background values for the area.

Results indicate that the ambient ground level concentrations at Brú na Boinne are significantly below the relevant air quality standards for all species modelled. The results for NO₂ indicate that levels at Brú na Boinne reach only 6% of the limit value. With regard to SO₂, the predicted levels at Brú na Boinne will reach at most 2.4% of the limit value, and for all other species modelled, the predicted levels at Brú na Boinne will reach 0.01-8.3% of their respective limit values.

Cumulative Assessment

The cumulative air dispersion modelling impact assessment at Brú na Boinne resulting from the proposed Waste Management Facility at Carranstown and the two significant nearby facilities (Irish Cement Ltd., Platin and Marathon Power) is outlined below. The cumulative scenario considered the maximum allowable emissions under Irish Cement Ltd's IPC Licence (No. 268). It is likely that typical emissions will be significantly lower than that investigated here. Details of the maximum ambient ground level concentrations are given in Table 1.10 and are compared with the relevant ambient air quality standards. The predicted emission concentration incorporates worst-case background values for the area.

Results indicate that the ambient ground level concentrations at Brú na Boinne are below the relevant air quality standards for all scenarios.

NO₂ results indicate that levels at Brú na Boinne may reach 20% of the maximum 1-hr limit value (as a 99.8thile) based on a 40m stack and 18% based on a 65m stack. However, the major contribution, in each scenario, at this maximum is the emissions from Irish Cement Ltd, under maximum IPC Licence limits, with the contribution from the Carranstown facility minor in both cases.

Similarly, SO₂ results indicate that levels at Brú na Boinne may reach 64% of the maximum 1-hour limit value (as a 99.7thile) based on a 40m stack. The effect of raising the Carranstown Waste Management Facility stack to 65m will be insignificant and will not affect the cumulative maximum 1-hr value (as a 99.7thile). In both cases, the major contribution at this maximum is Irish Cement Ltd under maximum IPC Licence limits. The effect of the stack increase on the maximum 24-hour limit value (as a 99.2thile) will be minor with the overall maximum decreasing from 41.8% to 41.4% of the limit value.

PM₁₀ results indicate that levels at Brú na Boinne will be minor based on either a 40m or 65m stack. Again, the effect of raising the Carranstown Waste Management Facility stack to 65m will be insignificant and will have only a minor affect on the cumulative maximum 24-hr value (as a 90thile). Again, the major contribution at this maximum is Irish Cement Ltd, whilst the annual average is almost entirely dictated by emissions from Irish Cement Ltd, under maximum IPC Licence limits.

Dioxin results indicate that levels at Brú na Boinne will be a minor fraction of background levels based on either a 40m or 65m stack. The effect of raising the Carranstown Waste Management Facility stack to 65m will be decrease levels from approximately 1.3% to 0.7% of background levels.

6.0 CONCLUSION

Since the levels of all species are significantly lower than the Human and Ecosystem Standards set by the EU and other European bodies, the impact of the Carranstown Waste Management Facility at Brú na Boinne will be insignificant.

There are no defined standards relating to the effects of ambient air pollutants on stonework or historical monuments. However, the 1999 Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution, has set emissions ceilings for NO_x, SO₂ and VOCs. National Emissions Ceilings for Ireland in 2010 have recently been passed into Irish legislation as S.I. No. 10 of 2004. Emissions of NO_x, SO₂ and VOCs from Carranstown Waste Management Facility will reach at most 0.4% of their National Emissions Ceilings in 2010.

Cumulatively, results indicate that levels at Brú na Boinne will be below the relevant limit values under all scenarios. The effect of raising the Carranstown Waste Management Facility stack to 65m will be insignificant and will not materially affect the cumulative results.

References

- (1) UNECE (1999) Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone
- (2) Environmental Protection Agency (2003) Air Quality Monitoring Report 2001
- (3) Environmental Agency, (1997) Technical Guidance Note E1: Best Practice Environmental Option Assessments for Integrated Pollution Control
- (4) USEPA (1996) Application of Ozone Limiting Method – Model Clearinghouse Memorandum #107
- (5) USEPA (1997) Use of the Ozone Limiting Method for Estimating Nitrogen Dioxide Concentrations
- (6) USEPA (2003) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1

For inspection purposes only.
Consent of copyright owner required for any other use.

Pollutant	Regulation	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	1999/30/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	50% until 2001 reducing linearly to 0% by 2010	200 $\mu\text{g}/\text{m}^3$ NO ₂
		Annual limit for protection of human health	50% until 2001 reducing linearly to 0% by 2010	40 $\mu\text{g}/\text{m}^3$ NO ₂
		Annual limit for protection of vegetation ⁽¹⁾	None	30 $\mu\text{g}/\text{m}^3$ NO + NO ₂
Sulphur dioxide	1999/30/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	43% until 2001 reducing linearly until 0% by 2005	350 $\mu\text{g}/\text{m}^3$
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	None	125 $\mu\text{g}/\text{m}^3$
		Annual & Winter limit for the protection of ecosystems ⁽¹⁾	None	20 $\mu\text{g}/\text{m}^3$
Particulate Matter Stage 1	1999/30/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50% until 2001 reducing linearly to 0% by 2005	50 $\mu\text{g}/\text{m}^3$ PM ₁₀
		Annual limit for protection of human health	20% until 2001 reducing linearly to 0% by 2005	40 $\mu\text{g}/\text{m}^3$ PM ₁₀
Particulate Matter Stage 2 ¹	1999/30/EC	24-hour limit for protection of human health - not to be exceeded more than 7 times/year	To be derived from data and to be equivalent to Stage 1 limit value	50 $\mu\text{g}/\text{m}^3$ PM ₁₀
		Annual limit for protection of human health	50% until 2005 reducing linearly to 0% by 2010	20 $\mu\text{g}/\text{m}^3$ PM ₁₀

(1) An annual average limit of 30 $\mu\text{g}/\text{m}^3$ for both NO and NO₂ and an annual average limit of 20 $\mu\text{g}/\text{m}^3$ SO₂ is applied for the protection of vegetation in highly rural areas away from major sources of NO_x and SO₂ such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the NO_x limit for the protection of vegetation should be carried out distances greater than:

- 5 kilometers (km) from the nearest motorway or dual carriageway
- 5 km from the nearest industrial installation
- 20 km from a major urban conurbation or more than 5km from other built-up areas

As a guideline, a monitoring station should be indicative of approximately 1000 km² of surrounding area. Indaver does not consider the Directive limit for the protection of vegetation should be applied given the nearby presence of an industrial installation (Platin Cement) and the presence of a built-up area, Drogheda within 5km.

Table 1.1 EU Ambient Air Standard - Council Directive 1999/30/EC (transposed in Irish Law as S.I. 271 of 2002)

Pollutant	National Emissions Ceilings by 2010 (tonnes/annum) ⁽¹⁾	Indaver Emissions under Maximum Operations (tonnes/annum)	% of National Emissions Ceiling
Nitrogen Oxides (NO _x)	65,000	265	0.41
Sulphur Dioxide (SO ₂)	42,000	66	0.16
Volatile Organic Compounds	55,000	13.2	0.024

(1) S.I. No. 10 of 2004

Table 1.2 Comparison of Emissions from Carranstown Waste Management Facility to the National Emissions Ceilings

Pollutant	Regulation	Limit Type	Class	Value
TOC	TA Luft	Hourly limit for protection of human health – expressed as a 98 th percentile	Class III	1000 µg/m ³
			Class II	200 µg/m ³
			Class I	50 µg/m ³
HCl	TA Luft	Hourly limit for protection of human health – expressed as a 98 th percentile	100 µg/m ³	
HF	TA Luft	Hourly limit for protection of human health – expressed as a 98 th percentile	3 µg/m ³	
HF	WHO	Gaseous fluoride (as HF) as an annual average.	0.3 µg/m ³	
HF	Dutch	mean fluoride (as HF) concentration during the growing season (April to September)	0.4 µg/m ³	
HF	Dutch	Ambient gaseous fluoride (as HF) as a 24-hour average concentration.	2.8 µg/m ³	

Table 1.3 Air Standards for TOC, HCl and HF

Pollutant	Regulation	Limit Type	Value
Inorganic Mercury (as Hg)	WHO	Annual Average	1.0 µg/m ³
Cd	TA Luft	Annual Average	0.04 µg/m ³
Cd	WHO	Annual Average	0.005 µg/m ³
Cd	EU	Annual Average	0.005 µg/m ³⁽¹⁾
Tl	EAL	Annual Average	1.0 µg/m ³

(1) Proposed EU assessment thresholds (COM(2003) 423 Final)

Table 1.4 Hg, Cd & Tl Ambient Air Quality Standards & Guidelines

Pollutant	Regulation	Limit Type	Value
Sb (organic compounds)	EAL	Maximum One-Hour	5 µg/m ³
Sb (organic compounds)	EAL	Annual Average	1.0 µg/m ³
As	WHO	Annual Average	0.005 µg/m ³
As	EU	Annual Average	0.006 µg/m ³⁽¹⁾
Pb	EU	Annual Average	0.5 µg/m ³
Cr (except VI)	EAL	Annual Average	5.0 µg/m ³
Cr (VI)	EAL	Annual Average	0.5 µg/m ³
Co	EAL	Annual Average	1.0 µg/m ³
Cu (fumes)	EAL	Annual Average	2.0 µg/m ³
Cu (dust & mists)	EAL	Annual Average	10 µg/m ³
Mn	WHO	Annual Average	0.15 µg/m ³
Mn (fume)	EAL	Maximum One-Hour	75 µg/m ³
Ni	EU	Annual Average	0.02 µg/m ³⁽¹⁾
V (fume & respirable dust)	EAL	Annual Average	0.4 µg/m ³
V	WHO	24-Hour Average	1.0 µg/m ³

(1) Proposed EU assessment thresholds (COM(2003) 423 Final)

Table 1.5 Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V Ambient Air Quality Standards & Guidelines

Substance	Background Concentration ($\mu\text{g}/\text{m}^3$)
NO ₂	10
SO ₂	4
PM ₁₀	20
CO	200
TOC	100
HCl	0.01
HF	0.005
Dioxins	0.028 - 0.046 pg/m^3
Cd	<0.023 ⁽¹⁾
Hg	0.005 ⁽¹⁾
Sb	0.012 ⁽¹⁾
As	<0.02 ⁽¹⁾
Mn	0.012
Ni	0.006 ⁽¹⁾

(1) Worst case background levels.

Table 1.6 Background levels of species used in the dispersion modelling (for Indaver Waste Licence Application).

For inspection purposes only.
Consent of copyright owner required for any other use.

Stack Reference	Stack Height (m)	Exit Diameter (m)	Cross-Sectional Area (m ²)	Temperature (K)	Max Volume Flow (Nm ³ /hr)	Exit Velocity (m/sec actual)	Concentration (mg/Nm ³)	Mass Emission (g/s)
Maximum	40 ⁽¹⁾ , 65 ⁽²⁾	2.0	3.14	373	150980	18.24	NO ₂ – 200 SO ₂ – 50 PM ₁₀ – 10 CO – 100 TOC – 10 HCl – 10 HF – 1.0 Dioxins – 0.1 ng/m ³ Cd & Tl – 0.05 Hg – 0.05 Sum of Metals – 0.5 As & Nil – 0.015	NO ₂ – 8.39 SO ₂ – 2.10 PM ₁₀ – 0.42 CO – 4.2 TOC – 0.42 HCl – 0.42 HF – 0.042 Dioxins – 4.2E-9 Cd & Tl – 0.0021 Hg – 0.0021 Sum of Metals – 0.021 Cd & Tl – 0.00063

⁽¹⁾ Stack height specified in Indaver Waste Management Licence Application.

⁽²⁾ Stack height proposed by the EPA.

Table 1.7 Source Emission Data for Emissions of Indaver Ireland

For inspection purposes only.
Consent of copyright owner required for any other use.

Stack Reference	Stack Height (m)	Exit Diameter (m)	Cross-Sectional Area (m ²)	Temperature (K)	Max Volume Flow (Nm ³ /hr)	Exit Velocity (m/sec actual)	Concentration (mg/Nm ³)	Mass Emission (g/s)
Stack	49.9	7.0	38.5	369	2451600	17.7	NO ₂ - 120 SO ₂ - 140	70 60.5 ⁽¹⁾

(1) Taken from EIS for the site.

Table 1.8 Source Emission Data For Emissions of Marathon Power⁽¹⁾

Stack Reference	Stack Height (m)	Exit Diameter (m)	Cross-Sectional Area (m ²)	Temperature (K)	Max Volume Flow (Nm ³ /hr)	Exit Velocity (m/sec actual)	Concentration (mg/Nm ³)	Mass Emission (g/s)
Stack 1	106.7	2.3	4.15	513	140,000	17.6	NO ₂ - 1,800 SO ₂ - 4,000 Dioxins - 0.0599 ng/m ³	70 156 2.3E-09
Stack 2	103.3	3.7	10.8	397	490,000	18.4	NO ₂ - 1,800 SO ₂ - 4,000 Dioxins - 0.0609 ng/m ³	245 544 8.3E-09

(1) Taken from IPC Licence Application for the site (Licence No. 268).

Table 1.9 Source Emission Data For Emissions of Irish Cement⁽¹⁾

For inspection purposes only.
Consent of copyright owner required for any other use.

Pollutant / Scenario ⁽¹⁾	Indaver Stack Height	Averaging Period	Process Contribution ($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	Predicted Emission Concentration ($\mu\text{g}/\text{Nm}^3$)	Ambient Standard ($\mu\text{g}/\text{Nm}^3$)	Process Contribution as % of Ambient Standard
NO ₂ / Max	40	Annual Mean ⁽²⁾	0.69	10	10.7	40	1.7
		99.8 th ile of 1-hr means ⁽³⁾	11.6		31.6	200	5.8
	65	Annual Mean ⁽²⁾	0.31	10	10.3	40	0.78
		99.8 th ile of 1-hr means ⁽³⁾	6.7		26.7	200	3.4
NO _x / Max	40	Annual Mean (Vegetation)	0.92	15	15.9	30	3.1
	65	Annual Mean (Vegetation)	0.41		15.4		1.4
NO ₂ / Cum	40	Annual Mean ⁽²⁾	2.1	10	12.1	40	5.3
		99.8 th ile of 1-hr means ⁽³⁾	40.3		60.3	200	20.2
NO ₂ / Cum	65	Annual Mean ⁽²⁾	1.9	10	11.9	40	4.8
		99.8 th ile of 1-hr means ⁽³⁾	35.2		55.2	200	17.6
SO ₂ / Max	40	99.7 th ile of 1-hr means	8.5	4	16.5	350	2.4
		99.2 th ile of 24-hr means	2.4		6.4	125	1.9
	65	99.7 th ile of 1-hr means	5.3	4	13.3	350	1.5
		99.2 th ile of 24-hr means	1.3		5.3	125	1.0
SO ₂ / Max	40	Annual Mean (Ecosystems)	0.23	4	4.2	20	1.2
	65	Annual Mean (Ecosystems)	0.10		4.1		0.5
SO ₂ / Cum	40	99.7 th ile of 1-hr means	222.9	4	230.9	350	63.7
		99.2 th ile of 24-hr means	52.3		56.3	125	41.8
SO ₂ / Cum	65	99.7 th ile of 1-hr means	222.9	4	230.9	350	63.7
		99.2 th ile of 24-hr means	51.8		55.8	125	41.4

(1) Max = Maximum Operation; Cum = Cumulative assessment of Indaver, Marathon Power and Irish Cement

(2) Conversion factor following guidance from USEPA (Tier 2 analysis, annual average) based on the default ratio of 0.75 (worst-case).

(3) Conversion factor, following guidance from USEPA (Tier 3 analysis), based on empirically derived site-specific maximum 1-hour value for NO₂ / NO_x of 0.30

Table 1.10 Carranstown Dispersion Model Results at Brú na Boinne

Pollutant / Scenario ⁽¹⁾	Indaver Stack Height	Averaging Period	Process Contribution ($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	Predicted Emission Concentration ($\mu\text{g}/\text{Nm}^3$)	Ambient Standard ($\mu\text{g}/\text{Nm}^3$)	Process Contribution as % of Ambient Standard
PM ₁₀ / Max	40	90.5 th ile of 24-hr means	0.18	20	20.2	50	0.36
		Annual Mean	0.046		20.0	40	0.12
	65	90.5 th ile of 24-hr means	0.076	20	20.1	50	0.15
		Annual Mean	0.021		20.0	40	0.05
PM ₁₀ / Cum	40	90.5 th ile of 24-hr means	3.2	20	23.2	50	6.4
		Annual Mean	0.84		20.8	40	2.1
PM ₁₀ / Cum	65	90.5 th ile of 24-hr means	3.1	20	23.1	50	6.2
		Annual Mean	0.82		20.8	40	2.1
TOC / Max	40	98 th ile of 1-hr means	0.77	100	200	1000	0.08
	65	98 th ile of 1-hr means	0.39		200		0.04
HCl / Max	40	98 th ile of 1-hr means	0.77	0.01	0.77	100	0.77
	65	98 th ile of 1-hr means	0.39		0.40		0.39
HF / Max	40	98 th ile of 1-hr means	0.077	0.005	0.087	3.0	2.6
		Maximum 24-hr	0.098		0.103	2.8	3.5
		Annual Average	0.0046		0.0096	0.3	1.5
	65	98 th ile of 1-hr means	0.039	0.005	0.049	3.0	1.3
		Maximum 24-hr	0.031		0.035	2.8	1.1
		Annual Average	0.0021		0.007	0.3	0.70

(1) Max = Maximum Operation; Cum = Cumulative assessment of Indaver, Marathon Power and Irish Cement

Table 1.10(contd.) Carranstown Dispersion Model Results at Brú na Boinne

Pollutant / Scenario ⁽¹⁾	Indaver Stack Height	Averaging Period	Process Contribution (ng/m ³)	Background (ng/m ³)	Predicted Emission Concentration (ng/Nm ³)	Ambient Standard (ng/Nm ³)	Process Contribution as % of Ambient Standard
Dioxins / Max	40	Annual Mean	0.43 fg/m ³	28 – 46 fg/m ³	28.3 – 46.4 fg/m ³	N/A	1.54 – 0.93 ⁽²⁾
	65	Annual Mean	0.20 fg/m ³		28.2 – 46.2 fg/m ³		0.71 – 0.43 ⁽²⁾
Dioxins / Cum	40	Annual Mean	0.47 fg/m ³	28 – 46 fg/m ³	28.3 – 46.5 fg/m ³	N/A	1.66 – 1.01 ⁽²⁾
Dioxins / Cum	65	Annual Mean	0.24 fg/m ³	28 – 46 fg/m ³	28.2 – 46.2 fg/m ³	N/A	0.86 – 0.52 ⁽²⁾
Hg / Max	40	Annual Mean	0.21	5.0	5.2	100	0.21
	65	Annual Mean	0.10		5.1		0.10
Cd & Tl / Max	40	Annual Mean	0.10	<23 ⁽³⁾	<23.1	5	2.0
	65	Annual Mean	0.05		<23.1		1.0
Sum of Sb, Pb, Cr, Co, Cu, Mn and V / Max	40	Annual Mean	2.1	12	14.1	150	1.4
	40	Max 1-hour	415		439	5000	8.3
	65	Annual Mean	0.92	12	12.9	150	0.61
	65	Max 1-hour	99.5		124	5000	2.0
As / Max	40	Annual Mean	0.062	<20 ⁽³⁾	<20.1	6	1.0
	65	Annual Mean	0.028		<20.0		0.47
Ni / Max	40	Annual Mean	0.062	6.0	6.1	20	0.31
	65	Annual Mean	0.028		6.0		0.14

(1) Cumulative assessment of Indaver, Marathon Power and Irish Cement

(2) Predicted process contribution as a percentage of dioxin background

(3) Background determined from baseline monitoring. Detection limit of monitoring methodology above limit value.

Table 1.10(contd.) Carranstown Dispersion Model Results at Brú na Boinne

**UNESCO-ICOMOS reactive monitoring mission report on
the Archaeological Ensemble of the Bend of the Boyne
(Ireland)
17-21 February 2004**

Executive Summary

Following the Decision of the World Heritage Committee at its 27th session, a joint reactive monitoring mission to the Archaeological Ensemble of the Bend of the Boyne (Ireland) was undertaken from 17 to 21 February 2004 by Fumiko Ohinata (World Heritage Centre) and Tom Hassall (ICOMOS). The main aim of the mission was to evaluate the impact of a proposed municipal waste incinerator in the vicinity of the World Heritage site.

Having visited the site and examined all available planning documents as well as the different viewpoints expressed by the stakeholders, the mission has come to the opinion that the current application will not have a major effect on the outstanding universal value and the visual integrity of the Archaeological Ensemble of the Bend of the Boyne (Ireland).

The mission also considered a number of different issues concerning the state of conservation of the World Heritage property such as future infrastructure development and the definition of the buffer zone.

I. Mission Background

A joint UNESCO-ICOMOS reactive monitoring mission took place to the Archaeological Ensemble of the Bend of the Boyne (Ireland), known as Brú na Boinne, from 17 to 21 February 2004. This mission was undertaken in order to implement the decision of the World Heritage Committee (27COM 7B.80) at its 27th session in 2003 to evaluate the impact of a municipal waste incinerator in the vicinity of the World Heritage site (Annex 1). The mission consisted of Fumiko Ohinata (UNESCO World Heritage Centre) and Tom Hassall (ICOMOS).

During the mission a series of meetings were held with the Irish national authorities (see Annex 2 for the full programme and Annex 3 for the list of personnel with whom the mission had meetings), including the Department of the Environment, Heritage and Local Government (responsible for heritage policy), the Office of Public Works (National Monuments Board, responsible for the management of the site), the Meath County Council (both elected representatives and officers), the Applicants of the waste incinerator project (Indaver Ireland), local stakeholders (including the Brú na Boinne World Heritage Consultative Committee and An Taisce, The National Trust of Ireland, and the archaeologist who excavated one of the main elements of the site, George Eogen) and ICOMOS Ireland. The mission visited the World Heritage site and its buffer zone on three occasions and examined all available planning documents.

II. The Archaeological Ensemble of the Bend of the Boyne

The Archaeological Ensemble of the Bend of the Boyne, also known by the Irish phrase Brú na Boinne or Boyne Palace was inscribed in 1993 by the World Heritage Committee at its 17th session. The World Heritage site consists of three main prehistoric sites - Newgrange, Knowth and Dowth – which are situated on the north bank of the River Boyne, 50 km north of Dublin (see Annex 5 for the location).

The outstanding universal value is given in the inscription as:

Criterion i) The Bend of the Boyne monuments represent the largest and most important expression of prehistoric megalithic plastic art in Europe.

Criterion iii) The concentration of social, economic, and funerary monuments at this important ritual centre and the long continuity from prehistory to the late medieval period make this one of the most significant archaeological sites in Europe.

Criterion iv) The passage grave, here brought to its finest expression, was a feature of outstanding importance in prehistoric Europe and beyond.

It is against these criteria and the information provided in the nomination dossier that the mission evaluated the development proposal.

The extent of the nominated area is approximately 780 ha and the total area including the buffer zone is 3300 ha. Within the north eastern buffer zone is the site of the Battle of the Boyne (1690) which was fought between the forces of James II and

William of Orange. The main part of the battlefield has been purchased by the Irish Government. This battle is of historic importance for the history and culture of both the Republic of Ireland and Northern Ireland.

III. General State of Conservation and Management

The mission was delighted to discover that a management plan (Brú na Bóinne World Heritage site Management Plan) was published in December 2002 by the former national heritage service, Dúchas. The management plan had not been submitted to the World Heritage Centre prior to the mission. It is important that the State Party receives feedback on the management plan from the World Heritage Committee via the World Heritage Centre and the Advisory Bodies. The mission also feels that it is necessary to enforce the existing mechanism for assessing a management plan produced subsequent to the inscription of a site.

A visitor centre in the southern buffer zone, which was anticipated in the original nomination dossier, was constructed in June 1997 and it provides an appropriate gateway and interpretation centre for the site. The site is currently visited by 220,000 people every year. These large numbers are carefully controlled and transported between the components parts of the sites by shuttle bus accompanied by a guide.

There has been extensive reconstruction work carried out at Newgrange and Knowth. Particular attention has been paid to protect the megalithic art from the effect of weathering by wind and frost. At the time of the mission's visit additional protection was provided by the use of temporary protective plastic covers.

A published comprehensive study was made available by G. Stout for the archaeology, history and development of the landscape of the site which provided useful background information to the mission (Annex 4).

IV. The Municipal Waste Incinerator proposal

* The original development application by Indaver Ireland was for the construction of a waste management facility to service Ireland's north-east region. It included a community recycling park (2000 tonnes/year), recycling plant for non-hazardous material (20,000 tonnes/year) a waste energy facility (150,000 tonnes/year). The proposed site is located south of the southern buffer zone of the World Heritage site, approximately 1.5 km from the buffer zone and 3.5 km away from the edge of the inscribed area (Annex 6). The proposed site is in the vicinity of a thirty year old cement manufacturing plant, whose two chimneys, painted red and white, are clearly visible from the World Heritage site. Planning permission has recently been given for a gas powered electricity generation facility, adjacent to the application site. The total site for the waste incinerator is approximately 10 ha of which 4 ha would be developed for the incinerator facility and the rest will be used for landscaping the area. The applicant originally proposed a waste emission stack 40 m high on which there would be an aviation warning light.

The application has proved to be extremely controversial, as demonstrated by a large number of objections following receipt of the planning application by the Meath County Council, the planning authority, in January 2001. Most of the objections were based on environmental and health concerns. The planning application was accompanied by an Environmental Impact Assessment carried out by Indaver Ireland. Following provision of further information, the planning authority decided to grant a planning permission in July 2001. The grant of permission was subject to an appeal to An Bord Pleanála - the national appeal board for planning applications.

This procedure meant that the original application was superseded by the appeal process. The Board considered all the original application documentation, and appointed an independent planning inspector to advise on the issues. The inspector also held an oral hearing. The inspector in his report recommended refusal of the application, but having considered his advice and national policy consideration, the Board An Bord Pleanála recommended grant of permission in March 2003, subject to the removal of the community recycling park and a limit on the annual tonnage for thermal treatment/recycling of 170,000 tonnes per annum. The Board's decision is currently subject to a judicial review.

In parallel with the planning process outlined above, the Irish Environmental Protection Agency (EPA) has also been assessing the application for a Waste Licence since December 2001. Indaver, however, informed the World Heritage Centre shortly after the mission on 27 February 2004 that the Environmental Protection Agency has advised the Meath County Council an increase in the height of the stack from 40m to 65m. This is to facilitate further dispersal of potential emissions. The recommendation of the EPA overrides the existing planning consent according to the Irish legislation.

V. The findings of the mission as regards to the waste incinerator

There were three main findings of the mission with regard to the waste incinerator:

1. Direct possible impacts: The proposed waste incinerator lies south of the southern buffer zone in an area highly degraded by quarrying. The application site has been subject to an archaeological assessment which also placed it in its regional archaeological context. The assessment concluded that there was no evidence for the existence of any archaeological material on the site and certainly nothing to suggest any cultural remains from the megalithic period. On the basis of the assessment the mission feels that there are no grounds for believing that the construction of the proposed incinerator itself would have a direct impact on the outstanding universal value of the World Heritage site. Any effect on possible archaeological sites of local significance within the application area would be mitigated by archaeological monitoring.

Concern was expressed to the mission that the proposal would also impact on the Battle of the Boyne site within the buffer zone. The retreat of the Jacobite forces from Donore village to Duleek village after the main Battle of the Boyne appears to have followed a route west of the application site. The construction of the incinerator would not appear to preclude any possible interpretation of the course of the Battle.

2. Visual impacts: Good weather, with excellent visibility, allowed the mission to evaluate the visual impact of the proposed waste incinerator. The application area is separated from the inscribed area by a ridge of high ground with Red Mountain (121 ODM) at its western end and Donore Hill (104 ODM) at its eastern end. Between the two hills there is a saddle on which lies the village of Donore at 70 ODM. From the inscribed area there are protected views from Knowth, Newgrange and Dowth as indicated in the Appendix 9 of the original nomination dossier and confirmed in the County Meath Development Plan (2001). The views from New Grange and Dowth are somewhat compromised by two factory chimneys belonging to the Platin cement factory which are clearly visible on the eastern side of the Donore saddle. The tallest of these chimneys is 106m in height. The original nomination dossier and supporting photographs make no mentions of the cement factory and its disturbance to the general view out of the site.

The applicant provided photomontages and lines of sight information which indicated that the stack, at its original height of 40 m would not be visible from the inscribed site. Given the recent recommendation by the Environmental Protection Agency to increase the height of the stack from 40 m to 65 m, Indaver subsequently prepared a new photomontage and submitted to the World Heritage Centre on 15 March 2004 to assess the effect on the protected view out of the site. According to the revised photomontage, the chimneystack will be visible from Dowth but not from Newgrange. This is because the outlet of the chimney is at least 100 m above sea level (65m high chimney stack and approximately 35 m ground level). The top of Dowth is about 75 m above sea level. The maximum height of the valley between Red mountain and Donore hill is 70 m above sea level. Therefore the hills will not now obstruct the sight line between the World Heritage site and the proposed incinerator location. This contradicts the statement of the nomination dossier (page 35) and the objective of the Meath County Development Plan of 2001 to protect a number of significant scenic views, some of which belong to the World Heritage property such as VP16. Mitigating measures by way of landscaping may conceal the facility from the nearby road but it would not diminish the visual impact of the proposed development for the World Heritage site.

Dowth

*

Stack
plume

The mission also considered the possibility that smoke plume from the stack might be visible. The applicants assured the mission that they have considered this issue and had accordingly made provision for a secondary combustion chamber which would eliminate any visible emission, except on a dump foggy day when the emission would not be visible against background cloud.

While the construction of the incinerator stack will be a visual intrusion, the mission considers that it would have a minimum impact on the World Heritage site compared with the existing cement factory nearby. The mission recommends that the World Heritage Committee requests the Advisory Bodies to prepare a guideline for visual impact assessments including cases where developments are situated outside a buffer zone in rural environments and may interfere with the outstanding universal value of World Heritage sites.

3. Possible impacts of polluting emissions: The mission noted that the great care has been taken to protect the megalithic art at the World Heritage site and was therefore

Impact on
stonework

particularly concerned to understand whether or not emissions from the proposed incinerator could cause possible damage. In the Environment Impact Assessment it is noted that the prevailing wind is normally south-west and north-west therefore would take the emissions away from the World Heritage site, however at the time of the mission's visit the wind was blowing from the south-east. The actual estimated chemical composition of the emissions is provided in the Environment Impact Assessment and the mission is seeking scientific advice from appropriate experts, including ICOMOS Ireland and the International Council of Scientific Union (ICSU). In addition the applicant commissioned research to examine this issue after the mission which was subsequently reported to the World Heritage Centre on 15 March 2004. According to the assessment by AWN Consulting Ltd, the emission of pollutant such as SO₂ and NO_x are well within the regulatory limit set by the EU and other European Bodies. The report further comments that there are no defined standards relating to the effects of ambient air pollutants on stonework or historical monuments. The mission recommends that the Office of Public Works develops a methodology for monitoring the state of conservation of the World Heritage site, particularly the effect of the ambient air pollutant on stonework or historical monuments. *

VI. Conclusion

In response to the question posed by the World Heritage Committee (27COM.7B.80) the mission considers that the current application will probably not have a major effect on the outstanding universal value of the Archaeological ensemble of the Bend of the Boyne (Ireland).

The mission considered that it was beyond its terms of reference to consider and comment on the all the other numerous planning and environmental issues raised by this specific application.

VII. Other issues

In the course of the mission a number of other issues were identified which the mission felt should be brought to the attention of the World Heritage Committee:

1. World Heritage focal point

The World Heritage Committee instigated the mission because the Irish government had not provided information as requested on the incinerator project. Subsequently the commencement of the mission was delayed by a further lack of response from the State Party. Once the mission was established it received full cooperation from the State Party, however it was obvious that there was lack of clarity of roles between the Ministry of Education (which serves as the National Commission of Ireland for UNESCO) and the Department of Environment, Heritage and local Government with regard to World Heritage issues. This lack of clarity has been further exacerbated by recent organisational changes: the former state heritage service, Duchas has been disbanded and heritage policy now rest within the Department of Environment, Heritage and local Government, while day to day management of the World Heritage site lies the National Monuments Office part of the Office of Public Works. Within the staff of the both organisations appear to be considerable lack of knowledge of the World Heritage Convention and Operational Guidelines.

2. Original nomination

2.1 M1 Motorway – At the time of the nomination it was clear that the Irish Government had aspirations for a Dublin-Belfast motorway. The eastern boundary of the buffer zone was drawn on a line west of a possible route. However, no mention was made of this motorway in the main text of the nomination dossier although, an attached study discussed the proposed motorway. The implications for the site of the motorway were not discussed in the original ICOMOS evaluation. In the mission's opinion it would have been appropriate for the State Party to have drawn the attention of the World Heritage Committee to this proposed major piece of infrastructure and to have confirmed whether or not it would have had an impact on the outstanding universal value of the World Heritage site.

Two years after the inscription, an Environmental Impact Statement of the Motorway was published and this makes no reference to the World Heritage inscription or its impact on it. The Environmental Impact Statement is concerned largely with the narrow line of the preferred route. Once again, the mission considers that not only was this a major omission but also that the State Party should have informed the World Heritage Centre of its intention to build the motorway.

The motorway (M1) has now been constructed and recently opened in 2003. The motorway crosses the River Boyne by means of a cable-stayed bridge with a main span of 170 m and a single pylon rising to an elevation of 85 m above sea-level and its top stands 60 m above the highest adjacent ground level. The bridge and the motorway are clearly visible from the eastern end of the inscribed site, not only during the day, but also at night when it is illuminated with blue light with a red aviation warning light. There is also considerable noise pollution. There can be no doubt that the motorway has a considerable impact on the World Heritage site and even more impact on the main site of the Battle of the Boyne within the buffer zone. The mission, however, noted that the new bridge has already become something of a local icon.

Impact of M1

2.2 Clarification of boundaries in relation to the motorway (M1): The mission found that there was some confusion about the precise location of the motorway as built and the line of the buffer zone in the nomination dossier. The mission has requested that the State Party confirms the exact relationship of the motorway with the buffer zone. It may be necessary to consider some minor adjustments to the line of the buffer zone to rationalise the situation. This could be done as part of the Periodic Reporting process.

2.3 Mineral (lime stone) exploration: In the appended document to the nomination dossier (Boyne Valley Archaeological Park, Map No 5, page 15) areas of mining exploration licences are shown which indicate that licences have been taken out to include the north-east corner of the inscribed area and the greater part of the buffer zone. The mission has requested whether the licences are still in force as it is concerned of the possible implication that mineral extraction might be contemplated within the north-eastern area of the inscribed area and would also have grave reservations about any further extraction within the buffer zone.

Overlapping

3. Further infrastructure projects

3.1 Power station: The mission was informed that permission has been granted, following an appeal, for the construction of a power plant for 400 MW electricity generating plant at Carranstown. It will be situated immediately to the south-east of the proposed incinerator plant. The closer examination of the proposal indicated to the mission that the structure would be similar in size to the proposed incinerator and the emission stack would be 49.9 m, coloured grey and provided with warning lights. This stack is higher than the original proposal for the incinerator, but according to the inspector's report it will not be visible from the Boyne Valley. The impact, if any on the World Heritage site, was apparently not considered.

3.2 Slane bypass

The mission was informed that a new bypass is planned for the village of Slane immediately west of the inscribed World Heritage site which will require the building of a new bridge over the River Boyne. This new piece of infrastructure clearly needs to be evaluated for its possible impact and the mission urges the State Party to ensure that this forms part of the Environmental Impact Statement and informs the World Heritage Centre of its outcome.

4. Process of development control within the World Heritage site and its buffer zone

In the original nomination dossier (Appendix 3, pages 11-12) it is stated that:
"Conservation Measures (Protective, Legal, Administrative): In addition to the protection of the monuments under the National Monuments Acts as outlined above, the Core Area and Buffer Zones are defined as special Areas of Archaeological Interest in the Meath County Council (Planning Authority) County Development Plan established under the Planning Acts in 1989 (see also appendix 9). A stated objective of the Development Plan is the protection of these areas from undesirable development. In effect, this ensures that further development does not take place in the Core Area and that development in the Buffer Zones does not prejudice the management of the resource (e.g. views, access, archaeology) The State Agency directly responsible for the management of the archaeological resource, the Office of Public Works, is consulted regarding all planning applications in the area and has the opportunity to object or to insist on conditions to be attached to planning permissions."

The third sentence was particularly emphasised in the ICOMOS evaluation report, but as the mission saw on its visits development has taken place both within the core area and the buffer zone, some of it intrusive.

The mission received conflicting opinions on the effect of this development, ranging from the view that the inscribed area was rapidly being devalued to the point where continued inscription should be questioned, to the view that the local community, whose applications are 'not discouraged by successive development plans, are faced with objection from the state, even for individual family homes'. In this latter view it was expressed to the mission that while strategically significant infrastructure projects were granted permission, smaller scale proposals of importance to local residents were being refused.

Not seen

The mission suggests that the State Party might consider commissioning a study of the development issues as part of the forthcoming periodic review exercise. Such a study could include an assessment of the degree and impact of development, as well as a forecast of the likely scale of the demand for future development.

The mission supports the view expressed in the Management Plan for the World Heritage site that that document should be incorporated in both the Meath and Louth County Development Plans.

5. M3 and Hill of Tara

The mission feels it is necessary to record the strong feeling expressed by members of public concerning the proposed construction of the M3 highway and its potential impact on Hill of Tara. The area was the seat of the High Kings of Ireland in the first millennium AD as well as the site of a passage tomb known as the Mound of the Hostages that was built about 2500 BC. This is an area of extreme archaeological richness, confirmed by the geophysical surveys carried out along the proposed route corridor that will pass through the edge of Hill of Tara. The area is located approximately 15 km away from the southern edge of the inscribed area. The State Party has no intention of placing the Hill of Tara on the Irish Tentative List or proposing an extension to the existing World Heritage site of the Archaeological Ensemble of the Bend of the Boyne.

VIII. Recommendations:

The mission recommends to the Irish authorities that

- a) The World Heritage Centre be kept informed of any further changes in the design of the incinerator as well as the completion of the project in order to confirm that the visual impact is as minor as anticipated;
- b) The Office of Public Works develops a methodology for monitoring the state of the conservation of the World Heritage site, particularly the effect of ambient air pollutants on the stonework of the component monuments.
- c) The World Heritage management plan be adopted as part of the Meath and Louth County Development plans;
- d) The Department of Environment, Heritage and Local Government clarifies lines of communication with the Ministry of Education (National Commission of Ireland for UNESCO);
- e) The Department of Environment, Heritage and Local Government considers appointing an officer to serve as a focal point for World Heritage policy and related matters in co-operation with the Office of Public Works [Immediately after the mission, the World Heritage Centre received a notification from the Irish authorities on 26 February 2004 indicating that Mr Liam O Connell was appointed as a World Heritage focal point within the Department of Environment, Heritage and Local

Government and he will also assume responsibility as a focal point for the Periodic Reporting exercise];

f) The Office of Public Works considers appointing an officer with clear overall responsibility for the management of the World Heritage property at the site level;

g) Details of the revised National Monument Act and particularly its relevance to the World Heritage site, to be indicated in the Section I of the Periodic Report for the submission to the World Heritage Centre by December 2004;

h) The Department of Environment, Heritage and Local Government considers reviewing the eastern line of the buffer zone in the light of the line of the M1 Motorway as built;

i) The Department of Environment, Heritage and Local Government reviews the situation with regard to potential quarrying in the inscribed area and the buffer zone;

j) The Department of Environment, Heritage and Local Government considers commissioning a review of development impacts on the World Heritage site and report the conclusions to the World Heritage Centre.

IV. Members of the Mission

UNESCO

Fumiko Ohinata (World Heritage Centre, Europe and North America Unit)

ICOMOS

Tom Hassall

Acknowledgements

The mission wishes to acknowledge all the stakeholders involved in the safeguarding of the World Heritage site for their co-operation. We are particularly grateful for Mr Liam O Connell and Mr Paddy Breslin from the Department of the Environment, Heritage and Local Government who coordinated the work programme and ensured smooth running of the mission.

ANNEX 1: Extract from the Decision of the World Heritage Committee at its 27th session in 2003

Archaeological Ensemble of the Bend of the Boyne (Ireland)

Document: WHC-03/27.COM/7B

27 COM 7B.68 The World Heritage Committee,

1. Regrets that the State Party has not provided the information requested on the municipal waste incinerator in the vicinity of the World Heritage property;
2. Recalling paragraph 56 of the *Operational Guidelines*, inviting States Parties to provide information to the World Heritage Centre in case of major planning decisions affecting a World Heritage property;
3. Urges the State Party to provide the information requested, including an Environmental Impact Assessment at the earliest opportunity;
4. Requests UNESCO and ICOMOS to undertake a mission in consultation with the State Party to review the situation and the impact of the project on the value and integrity of the property and to submit a report in order that the World Heritage Committee can examine the state of conservation of the property at its 28th session in 2004.

For inspection purposes only. No other use.
Consent of copyright owner required for any other use.

ANNEX 2: Mission Programme

Wednesday 18 February 2004

- 10.00hrs:** Meath County Council Members of the Slane Electoral Area in Council offices in Duleek.
- 11.00hrs:** Visit to Brú na Boinne
- Objective:** To familiarise the UNESCO mission with the management and present state of conservation of the World Heritage Site and with the Management Plan for the site.
- Present:** Mission members, Personnel from Department of the Environment, Heritage & Local Government and Office of Public Works.
- 15.30 :** Meeting with NGOs
Cunningham Arms Hotel, Slane
- 20:00:** Dinner with members of the Department of the Environment, Heritage and Local Government

Thursday 19 February 2004

- 10.00:** Meath County Council offices, Duleek.
- 1415:** Examination of Planning File (which includes all documentation relating to the Planning Permission case)

Friday 20 February 2004

- 10.00:** Presentation by the representatives of Indaver Ireland, the Waste Incinerator applicant and visit to the site for the proposed incinerator
- 14.00:** ICOMOS Ireland, 64 Dame Street, Dublin 2.
- 16.30:** Meeting with Mr Eugene Keane who prepared the nomination dossier
- 17:00:** Meeting with former Attorney-General of Ireland, Mr John Rogers at his request
- 17:30** Concluding discussion with members of the Department of the Environment, Heritage & Local Government and Office of Public Works

ANNEX 3: Contact details of stakeholders

*The list is alphabetically ordered.

Department of Environment, Heritage and Local Government		
Paddy Breslin	Assistant Principal Officer, Heritage Policy	Department of the Environment, Heritage and Local Government, Dún Scéine, Harcourt Lane, Dublin 2 PBreslin@duchas.ie
Dave Fadden	National Monuments/Architectural Protection	Department of the Environment, Heritage and Local Government, Dún Scéine, Harcourt Lane, Dublin 2 DFadden@duchas.ie
Eugene Keane	National Parks and Wildlife	7 Ely Place, Dublin 2 Tel: +353 1 6472436 Fax: + 353 1 6788118 EKeane@duchas.ie
Mary Moylan	Division Chief, Heritage and Planning	Department of the Environment, Heritage and Local Government, Dún Scéine, Harcourt Lane, Dublin 2 mary_moylan@environ.ie
Liam O Connell	Principal Officer, Heritage Policy	Department of the Environment, Heritage and Local Government, Dún Scéine, Harcourt Lane, Dublin 2 LOConnell@duchas.ie
Geraldine Stout	Liaison Officer	Department of the Environment, Heritage and Local Government, Dún Scéine, Harcourt Lane, Dublin 2 GStout@duchas.ie
National Monuments		
Dermot Burke	Director of the Office of Public Works	dburke@duchas.ie
Ana Dolan	Senior Conservationist	adolan@duchas.ie
Martin Luby	Senior Conservationist	mluby@duchas.ie
Clare Tuffy	Director of the visitor centre	ctuffy@duchas.ie
Meath County Council		
Paul Barrell	Assistant Engineer, Duleek Office	pbarrell@meathcoco.ie
Mary Deevy	Meath County Council Project Archaeologist/National Roads Design Office	mdeevy@meathcoco.ie
Con Kehely	Area Engineer, Duleek Office	ckehely@meathcoco.ie
Michael Killeen	Meath County Council Chief Planning Officer	mkilleen@meathcoco.ie
Charles McCarthy	Meath County Council Senior Engineer	Cmccarthy@meathcoco.ie
John Quinlivan	Area Administrator, Duleek Office	jquinlivan@meathcoco.ie
Nicholas Whyatt	Meath County Council Senior Engineer/National Roads Design Office	Nwhyatt@meathcoco.ie
Meath County Council Members for the Slane Electoral Area		
Jummy Cudden	Councillor	
Anne Dillon- Gallagher	Councillor	
Hugh Gough	Councillor	
Tom Kelly	Councillor	
Shaun Lynch	Councillor	
Indaver Ireland		

John Ahern	Indaver Ireland, General Manager	4 Haddington Terrace, Dun Laoghaire, Co. Dublin, Ireland Tel: +353 1 214 5830, Fax: +353 1 280 7865, jahern@indaver.ie
Jackie Keaney	Indaver Ireland, Communications Manager	4 Haddington Terrace, Dun Laoghaire, Co. Dublin, Ireland Tel: +353 1 280 4534/ +353 1 663-7902, Fax: +353 1 280 7865, jkeaney@indaver.ie
ICOMOS Ireland		
Peter Cox	ICOMOS Ireland President	Carrig Conservation International ltd, 68 Dame Street, Dublin 2 Tel: +353 16715777, Peter@carrig.ie
Tom Cassiely	ICOMOS Ireland	
Tom O Conner	ICOMOS Ireland/ An Board Pleanala	
NGOs		
Billy Armstrong	MLA/UUP	028 87738641
Luke Bowden	Friends of Tara	www.friendsoftaras.com
Mary Burke	No Incinerator Alliance	041 9835584
Thomas C Burke	No Incinerator Alliance	tcaburke@hotmail.com
Frank Bynogl	Brú na Boinne Consultative Committee	041 9824258
Julitta Clancy	Meath Archaeological and Historical Society Save Tara-Sknyne Valley Campaign	018259438
Carol Davis	Meath Green Party Zero Waste Ireland Boyne & Newgrange Environmental Protection League No Incinerator Alliance	041 9825285 096 3572111 clambeadavis@yahoo.com
Kenny Donaldson	UUP researchers	00447900882770
George Eogan	University College Dublin	59 Brighton Road, Rathgar, Dublin 6 Tel: +353 14906218 eogan@tinet.ie
Pat Gogan	Brú na Boinne Consultative Committee	041 9880530
Brian Hanratty	Battle for the Boyne	Bian.hanratty@synergie 353 87 2589768
Allam Herr	Louth Zerowaste	042 9377689 042 9377691
Eugne Kearney	Brú na Boinne Consultative Committee	041 9845780
Robert Law	Brú na Boinne Consultative Committee	Rosnaree, Slane, County Meath rossnaree@circom.net +353 419820975
Ian Lumyley	An Taisee	Heritage@antaisce.org
Frank M'Cormack	Louth/Meath Health Protection Group	087 9951428
Muireann NíBhrolcháin	Save Tara-Skryne Valley	Muireann.NiBhrolchain@may.ie 017083711
PS Mooney	Brú na Boinne Consultative Committee	041 9824492
Gay Mullen	Brú na Boinne Consultative Committee	087 2594647
Pat O'Brien	No Incinerator Alliance	041 9823078

	Meath SPC	086 1662018
John Rogers	Former Attorney-General	
Vincent Salafia	Public Relations Officer Save Tara-Skryne Valley Campaign	353 1 667 6152 353 87 132 3365 salafiam@tcd.ie
Atopen Ward	Town Planning Consultant	042 9329791
Maria Warren	Brú na Boinne Consultative Committee	041 9824510
Ed Wheeler	Meath An Taisce	emwheeler@eircom.net 018256643

For inspection purposes only.
Consent of copyright owner required for any other use.

ANNEX 4: References

- An Bord Pleanála. 3 March 2003. Inspector's Report PL 17.126307. Meath County Council. Planning Register Reference Number 01/4014.
- County Meath. County Meath Development Plan. Adopted 1 May 1989.
- County Meath. Meath County Development Plan. 1994.
- Department of the Environment and Local Government and Dúchas. December 2002. Brú na Bóinne World Heritage site Management Plan.
- Indaver Ireland. 12 January 2001. Carranstown waste management facility. Environmental Impact Statement: Attachments.
- Indaver Ireland. 12 January 2001. Carranstown waste management facility Environment Impact Statement non-technical summary (DOC 002666-22-RP-003).
- Meath County Council, Louth County Council and Drogheda Corporation. August 1995. Environmental Impact Statement Northern Motorway (Gormanston-Monasterboice).
- Meath County Council. County Development Plan 2001. Volume 1. Objectives for the County at large.
- Meath County Council. County Development Plan 2001. Volume 2. Written Statements and detail objectives for Towns and Villages
- Meath County Council. County Development Plan 2001. Volume 3. Conservation.
- Meath County Council. County Development Plan 2001. Book of maps in conjunction with Volume two.
- Indaver Ireland. 12 January 2001. Carranstown waste management facility. Environmental Impact Statement.
- Nomination dossier for inclusion in the World Heritage List. Brú na Bóinne (Boyne Valley Archaeological Remains).
- O'Neill, A. M. November 1988. Boyne Valley Archaeological Park: a study in archaeological resource management (Draft). Commissioned by Board Fáilte Éireann.
- Stout, G. 2002. Irish Rural Landscapes: Volume I. Newgrange and the Bend of the Boyne. Cork: Cork University Press.

ANNEX 5: Map indicating the inscribed area and the buffer zone of the Archaeological Ensemble of the Bend of the Boyne (Ireland)

ANNEX 6: Map indicating the proposed waste incinerator site in relation to the Archaeological Ensemble of the Bend of the Boyne

*For inspection purposes only.
Consent of copyright owner required for any other use.*



IRISH AVIATION AUTHORITY
ÚDARÁS EITLÍOCHTA NA hÉIREANN

AVIATION HOUSE, HAWKINS STREET, DUBLIN 2, IRELAND
TEL: (01) 671 8655 FAX: (01) 679 2934
WEB SITE: www.iaa.ie
Aerodrome and Airspace Standards
Department

6th April 2004

Ref: AGA 1/1/1

**Ms. Jackie Keaney,
Communications Manager,
Indaver Ireland,
4 Haddington Terrace,
Dun Laoghaire,
Co. Dublin.**

**Re: Proposed Waste Management Facility at Carranstown, Duleek, Co. Meath
Planning Reference Nr.: 01/4014. Increase in Stack Height from 40m to 65m.**

Dear Ms. Keaney,

I refer to your letter dated 8th March 2004 on the subject of the proposed waste management facility at Carranstown, Duleek, Co. Meath in relation to the proposed increase in height of the 40 m high emissions stack to 65m above ground.

Following examination of the additional information in your letter, my letter to Mr. Robert Kelly, Project Engineer, dated 18th January 2002 still applies. The increase in the emissions stack height to 65m above ground level does not alter any of our requirements for lighting the structure in this case.

As noted in previous correspondence the Co-ordinates in WGS-84 (World Geodetic System - 1984) of the as-constructed position of the stack should be provided when available as well as the as-constructed elevation of the stack.

Should you have any queries on the above, please do not hesitate to contact me.

Yours sincerely,

Brendan King
Aerodromes and Airspace Standards



REGISTERED OFFICE : AVIATION HOUSE, HAWKINS STREET, DUBLIN 2, IRELAND
REGISTERED No. 211082

BOARD OF DIRECTORS:
DONAL J. GEANEY (CHAIRMAN), EAMONN BRENNAN (CHIEF EXECUTIVE),
NEIL BRANAGAN, PHILIP CAFFREY, FRANK CONWAY, KATH-LEEN DALY,
DONAL F. DOWNING, ANNE LAIT, SHEILA McCABE