An Ghníomhaireacht um Chaomhnú Comhshaoil

Integrated Pollution Control Licensing

BATNEEC Guidance Note for the Extraction of Minerals

Environmental Protection Agency
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This document does not purport to be and should not be considered a legal interpretation of the provisions and requirements of the E.P.A. Act, 1992.

Environmental Protection Agency
Wexford, Ireland.
Tel : +353-53-47120 Fax : +353-53-47119
e-mail: info@epa.ie Web: www.epa.ie

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ISBN 1 899965 86 6
EPA No. LC 29

Price IR. £5.00 **12/97/300**

Environmental Protection Agency

ESTABLISHED
The Environmental Protection Agency Act, 1992, was enacted on 23 April, 1992 and under this legislation the Agency was formally established on 26 July, 1993.

RESPONSIBILITIES
The Agency has a wide range of statutory duties and powers under the Act. The main responsibilities of the Agency include the following:

- the licensing and regulation of large/complex industrial and other processes with significant polluting potential, on the basis of integrated pollution control (IPC) and the application of best available technologies for this purpose;

- the monitoring of environmental quality, including the establishment of databases to which the public will have access, and the publication of periodic reports on the state of the environment;

- advising public authorities in respect of environmental functions and assisting local authorities in the performance of their environmental protection functions;

- the promotion of environmentally sound practices through, for example, the encouragement of the use of environmental audits, the establishment of an eco-labelling scheme, the setting of environmental quality objectives and the issuing of codes of practice on matters affecting the environment;

- the promotion and co-ordination of environmental research;

- the licensing and regulation of all significant waste recovery activities, including landfills and the preparation and updating periodically of a national hazardous waste plan for implementation by other bodies; and

- generally overseeing the performance by local authorities of their statutory environmental protection functions.

STATUS
The Agency is an independent public body. Its sponsor in Government is the Department of the Environment. Independence is assured through the selection procedures for the Director General and Directors and the freedom, as provided in the legislation, to act on its own initiative. The assignment, under the legislation, of direct responsibility for a wide range of functions underpins this independence. Under the legislation, it is a specific offence to attempt to influence the Agency, or anyone acting on its behalf, in an improper manner.

ORGANISATION
The Agency's headquarters are located in Wexford and it operates five regional inspectorates, located in Dublin, Cork, Kilkenny, Castlebar and Monaghan.

MANAGEMENT
The Agency is managed by a full-time Executive Board consisting of a Director General and four Directors. The Executive Board is appointed by the Government following detailed procedures laid down in the Act.

ADVISORY COMMITTEE
The Agency is assisted by an Advisory Committee of twelve members. The members are appointed by the Minister for the Environment and are selected mainly from those nominated by organisations with an interest in environmental and developmental matters. The Committee has been given a wide range of advisory functions under the Act, both in relation to the Agency and to the Minister.

Acknowledgements

The Environmental Protection Agency would like to acknowledge the Environmental Services Group, Forbairt who prepared the initial draft of this BATNEEC note.

The Agency would also like to take this opportunity to thank the following bodies who were consulted during the drafting of this note:

Advisory Committee, E.P.A.
Bord na Mona
County & City Engineers Association
Department of Enterprise and Employment
Department of the Environment
Department of the Marine
Industrial Development Authority
Irish Business and Employers Confederation
Irish Mining Exploration Group
Roadstone Provinces Ltd.

Contents

1. INTRODUCTION

This Guidance Note is one of a series issued by the Environmental Protection Agency and is designed to provide guidance to those applying for integrated pollution control licences under the EPA Act. It should also be read in conjunction with *Application Guidance Notes*, available under separate cover. While some guidance in relation to technologies for noise minimisation is included in this Note, in general noise aspects are dealt with in a separate *Guidance Note For Noise.*

This Guidance Note comprises six main sections and three appendices. Following this introduction, Section 2 contains a general note on the interpretation of BATNEEC. The industrial activity covered by the terms of this note is given in Section 3. In Section 4, the technologies to control emissions are tabulated and in Section 5 the specific emission limit values (ELVs) are given. The last section contains comments on compliance monitoring requirements. Appendix 1 gives the main sources of emissions, and the principal releases from such sources: Appendix 2 details the principal references used in drawing up this Guidance Note and Appendix 3 gives details of other IPC publications.

All applicants for Integrated Pollution Control licences, in the sector covered by this note, should carefully examine the information laid down in this Guidance Note, and should use this information to assist in the making of a satisfactory application for an Integrated Pollution Control licence to the Agency. It should be clearly understood that achieving the emission limit values does not, by itself, meet the overall requirements in relation to IPC. In addition to meeting such values the applicant will also be required to demonstrate that waste minimisation is a priority objective and to put in place particular abatement measures to reduce overall mass emissions and pollutant load where this is necessary to protect the ambient environment.

The technologies and the associated emission limit values (ELVs) identified in this Guidance Note are, at the time of writing, regarded as representing BATNEEC for new activities. BATNEEC is not a static quality and will change as technologies, environmental factors and costs alter with the passage of time. The Agency may amend or update the guidance contained in this note should such amendments seem appropriate. The information contained in this Guidance Note is intended to be used only as a tool to assist in determining the BATNEEC for an operation in this sector and should not be taken to be a definitive authority on the BATNEEC for this sector**.** This Note should not be considered as a legal document**.**

2. INTERPRETATION OF BATNEEC

BATNEEC means '*the best available technology not entailing excessive costs*'. The technology in question should be **Best** at preventing pollution and **Available** in the sense that it is procurable by the industry concerned. **Technology** itself is taken as the techniques and the use of the techniques, including training and maintenance etc.
NEEC addresses the balance between environmental benefit and financial expense.

The objective of the Best Available Technology Not Entailing Excessive Costs (BATNEEC) Guidelines is to provide a list of technologies which will be used by the EPA to determine BATNEEC for a scheduled activity. The BATNEEC identified in this Guidance Note is used as a basis for setting emission limit values. It is intended to update these guidelines as required in order to incorporate technological advances as they occur.

In the identification of BATNEEC, emphasis is placed on pollution prevention techniques, including cleaner technologies and waste minimisation, rather than end-of-pipe treatment. Consideration should be given to energy efficient technology and practices.

Technologies identified in the BATNEEC guidelines are considered to be current best practice for the purposes of setting emission limit values. These technologies are representative of a wide range of currently employed technologies appropriate to particular circumstances. However, the guidance issued in this note in respect of the use of any technology, technique or standard does not preclude the use of any other similar technology, technique or standard which may achieve the same emission. The entire range would not necessarily be appropriate in specific cases. The specific choice depends on a wide range of circumstances but the crucial factor is that the selected regime achieves BATNEEC. In applying BATNEEC, Environmental Quality Objectives (EQOs) must be respected where set. Measures such as in-plant changes, raw material substitution, process recycling and improved material handling and storage practices, may also be employed to effect reductions in emissions. As well as providing for the installation of equipment and the operation of procedures for the reduction of possible emissions, BATNEEC will also necessitate the adoption of an on-going programme of environmental management and control, which will focus on continuing improvements aimed at prevention, elimination and/or progressive reduction of emissions.

As described in the EPA Act of 1992, BATNEEC will be used to prevent, eliminate or, where that is not practicable, limit, abate, or reduce an emission from an activity which is listed in the First Schedule to the Act. The use of BATNEEC is construed in the Act to mean the provision and proper maintenance, operation, use and supervision of facilities which are the most suitable for the purposes.

In determining BATNEEC for an activity, regard shall be had to:

- the current state of technical knowledge;
- the requirements of environmental protection;
- the application of measures for these purposes, which do not entail excessive costs, having regard to the risk of significant environmental pollution which, in the opinion of the Agency, exists.

For existing facilities, additional regard shall be had to:

- the nature, extent and effect of the emission concerned;
- the nature and age of the existing facilities connected with the activity and the period during which the facilities are likely to be used or to continue in operation, and
- the costs which would be incurred in improving or replacing these existing facilities in relation to the economic situation of activities of the class concerned.

The technologies and the associated emission limit values (ELVs) identified in this Guidance Note are regarded as representing BATNEEC for a *new* activity. However, it is also generally envisaged that *existing* facilities will progress towards attainment of similar emission limit values, but the specific ELV requirements and associated time frames will be identified on a case by case basis when the licence application is being processed. Furthermore, for *all* facilities, additional and more stringent requirements may be specified on a site-specific basis whenever environmental protection so requires. Hence the BATNEEC guidelines are not the sole basis on which licence emission limit values are to be set, since information from other sources will also be considered, including site-specific environmental and technical data, plant financial data and other relevant information.

3. SECTOR COVERED BY THIS GUIDANCE NOTE

This Guidance Note covers SECTOR 1.3 of the activities specified in the First Schedule to the EPA Act, 1992. These are:

1.3 The extraction and processing (including size reduction, grading and heating) of minerals within the meaning of the Minerals Development Acts, 1940 to 1979, and storage of related mineral waste.

4. CONTROL TECHNOLOGIES

4.1 INTRODUCTION

As explained in Section 2, this Guidance Note identifies BATNEEC but obviously does so in the absence of site-specific information. Accordingly it represents the requirements expected of any new activity covered by the Note, but does not exclude additional requirements which may form part of the granting of a licence for a specific site.

The approach to be used in selecting BATNEEC is based on the following hierarchy:

- Process design / redesign changes to **eliminate** emissions and wastes that might pose environmental problems (e.g. use of powder coating instead of solvent based).

- **Substitution** of materials (e.g. water based coatings instead of solvent based) by environmentally less harmful ones.

- Demonstration of waste **minimisation,** as appropriate, by means of process control, inventory control and end-of-pipe technologies, etc.

The existing or possible measures for preventing, reducing and controlling emissions are described in this section. These range from relatively simple containment measures to sophisticated recovery and "end-of-pipe" technologies and include:

(i) Load minimisation
(ii) Containment
(iii) Recovery/recycle
(iv) Emission reduction
(v) Waste treatment and disposal

The technical feasibility of the measures listed below has been demonstrated by various sources. Used singly or in combination, the measures represent BATNEEC solutions when implemented in the appropriate circumstances. The circumstances depend on plant scale, materials used, nature of the products made, number of different products produced, etc. A summary of the treatments for various emissions is given at the end of the section.

Note that where hazardous (including asphyxiant) dusts or vapours occur, safety procedures (acceptable to the Health and Safety Authority) should be adopted. In these and any other matters concerning safety, appropriate safe working practices should be adopted and nothing in this note should be construed as advice to the contrary.

4.2 TECHNOLOGIES FOR LOAD MINIMISATION

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints).

- Tailings system selection to minimise dust emissions (e.g. flooded tailings, crusting agents).
- Minimisation of dust from stockpiles. e.g. enclosure, minimizing the size of stockpiles, wet suppression, temporary seeding, etc.
- Consideration of acid generation potential from all sources.
- Wet dust suppression for haul roads, yard surfaces, borrow pits, etc.
- Optimisation of water usage.
- Separation of storm water and process effluents of different origin in order to permit appropriate treatment options.
- Enclosed delivery and offloading points for dusty materials with extraction to bag filter.
- Wheel and body washing for vehicles (both site and off-site vehicles).
- Modelling (validated) of ground water systems.
- Selection of frequency and size of blast-charges.
- Wet processing where appropriate (BPEO) to minimise dust emissions.
- Use of grouting to minimise infiltration.
- Appropriate backfill technology.
- Pyrite removal/isolation.
- Press rather than drier technology.
- Determination and provision of appropriate closure options at design stage.
- Consideration of underground siting of noise emitting plant.
- Engineered containment of waste storage areas.
- Optimised recovery of metals.

4.3 PREVENTION OF EMISSIONS

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints).

- Enclosure of all handling, processing and product storage within a suitable building or underground.
- Closed transfer systems for milled material, raw materials, etc.
- Bunding of tanks.
- Overground pipelines and transfer lines.
- Overfilling protection on bulk storage tanks.
- Local extract systems as appropriate.
- Minimisation of tank filling losses.
- Cemented backfill to be used as appropriate.
- Suitable locations for vent raise discharges.
- Covered transport where appropriate

4.4 TECHNOLOGIES FOR RECOVERY AND RECYCLE

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints).

- Reuse of production wastes in another facility e.g. as cover material.
- Reuse of collected dusts.
- Reuse of recovery filtrate.
- Reusable containers for process chemicals.
- Reuse of tailing return water and mine water in mill operations.

4.5 TECHNOLOGIES FOR TREATING EMISSIONS TO AIR

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints).
(Symbols refer to Table 4.1)

- Filtration (T1).
- Wet scrubbers (T2).

4.6 TECHNOLOGIES FOR TREATING WATER EMISSIONS

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints).
(Symbols refer to Table 4.2)

4.6.1 Primary Treatment

- pH Correction/neutralisation (F1).
- Coagulation/flocculation/precipitation/oxidation(F2).
- Sedimentation/filtration/flotation (F3).
- Centrifugation (F4).

4.6.2 Secondary Treatment

- Biofilters/activated sludge (F5).
- Aeration lagoons (F6).

4.6.3 Tertiary Treatment

- Post-lagooning (F7).
- Wet lands (F8).
- Sand-Filtration (F9).
- Ion exchange (F10)

4.7 TECHNOLOGIES FOR THE TREATMENT AND DISPOSAL OF WASTES

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints).

4.7.1 Sludge Treatment

- Gravity thickening.
- Centrifugation.
- Belt-pressing.

4.7.2 Disposal

- Site development.
- Engineered containment of waste with appropriate aftercare provisions.
- Reuse in downstream processing.
- Backfill (underground mines).

Table 4.1 - Summary of Technologies for Treating Air Emissions

(Symbols refer to Section 4.5)

Technology	Emission
T1	Dust Fumes (Drill rigs, size reduction and classification, physio-chemical extraction dryers,) conveyors, indoor stockpiles)
T2	Dust (Dryers)

Table 4.2 - Summary of Technologies for Treating Water Emissions
(Symbols refer to Section 4.6)

Technology	Emissions
F1	Acids/Alkalis
F2	Organics/BOD Oils/Fats/Greases Suspended Solids
F3	Suspended Solids Dissolved Inorganics
F4	Suspended Solids
F5,F6	BOD
F6	Oxygen and CO_2 gas balancing
F7, F8, F9, F10	Final effluent - treatment Metal removal/precipitation Reduction in S.S.

5. EMISSION LIMIT VALUES

5.1 REFERENCE CONDITIONS

The reference conditions for concentrations of substances in emissions to air from contained sources are:

For non-combustion gases:

Temperature 273 ^{o}K; Pressure 101.3 kPa; no correction for water vapour content.

For combustion gases:

Temperature 273^{o}K; Pressure 101.3 kPa; dry gas; oxygen content 3% for liquid and gaseous fuels and 6% for solid fuels.

These units and reference conditions may not be suitable for continuous monitoring methods and may, by agreement with the Agency, be converted, for day to day control purposes, into values more suitable for the available instrumentation.

5.2 INTERPRETATION OF COMPLIANCE

Unless otherwise detailed in the licence, the following interpretation of compliance with limit values should apply:

5.2.1 Emissions to Air

For **continuously monitored** emissions, the following will be required for compliance with measurements based on 30 minute mean values (unless otherwise stated):

(i) 97% of all 30 minute mean measurements shall be below 1.2 times the emission limit.

(ii) No 30 minute mean measurement shall exceed 2.0 times the emission limit.

(iii) All daily mean values shall be less than the emission limit.

Where **periodic monitoring** is used to check compliance, all samples should meet the consent conditions.

5.2.2 Emissions to waters

The limit values for discharges to water are based on 24 hour flow proportional composite samples unless otherwise specified.

5.3 EMISSIONS TO AIR

Emission Limit Values representing BATNEEC are given in Table 5.1 below.

Table 5.1 - Emission Limit Values for Emissions to Air

Emission	Limit Value
Particulates	1 mg/m^3
Metals	As per T.A. Luft
Hydrogen sulphide	0.01 mg/m^3

(Achievement of ELV concentrations by the introduction of dilution air is not permitted.)

5.4 Emissions to Water

Effluent should be minimised by recovery of materials wherever practicable. The use of lower quality water may be possible for some parts of the process rather than fresh water.

All releases to waters are subject to a licence from the Agency. However any discharge to sewer will require the consent of the sanitary authority. BATNEEC to minimise the release of substances will generally include minimisation at source and either specific treatment of contaminated waste streams to remove particular substances or co-treatment of combined effluent streams or both. The Emission Limit Values for effluent discharges to waters are set out in Table 5.2.

Notwithstanding the Limit Values specified for particular parameters in the totality of the process and other effluents due regard shall be paid to the overriding principal of maintenance of the relevant environmental quality objectives in the receiving systems.

Table 5.2 - Emission Limit Values for Discharges to Water*

Constituent Group or Parameter	Limit Value	Notes
pH	6 - 9	4
BOD	90% removal **or** 25 mg/l	1,4
Toxic Units	5 Tu	2,4
Total Nitrogen (mg/l as N)**	> 80% Removal **or** 15 mg/l	4,5
Total Phosphorus (mg/l as P)**	>80% Removal **or** 2 mg/l	4
Total Ammonia (mg/l as N)	5	4
Oils, Fats and Grease (mg/l)	25	4
Fish Tainting	No Tainting	3,4
Mineral Oil (Interceptor) (mg/l)	100	4
Mineral Oil (Effluent) mg/l	1	4
Metals, Cyanides, etc.	As appropriate	6

* All values refer to daily averages, except where otherwise stated to the contrary, and except for pH which refers to continuous values. Limits apply to effluent prior to dilution with uncontaminated streams, e.g. stormwaters, cooling waters, etc.

** Only applicable to waters subject to eutrophication. One or both limits may apply depending on the sensitivity of the receiving waters.

Notes for Table 5.2

1. The daily raw waste load for BOD and Suspended Solids is defined as the average daily mass arising for treatment over any three month period.

   Calculations of the removal rates for BOD and Suspended Solids should be based on the differences between the waste loads arising for disposal and those discharges to the receiving waters. The amounts removed by treatment (physical, chemical, biological) may be included in the calculation.

2. The toxicity of the effluent shall be determined by testing an appropriate aquatic species. The number of toxic units (Tu) = 100/x hour EC/LC_{50} in percentage vol/vol so that higher Tu values reflect greater levels of toxicity. For test regimes where species death is not easily detected, immobilisation is considered equivalent to death.

3. No substances shall be discharged in a manner which, or at a concentration which, following initial dilution causes tainting of fish or shellfish, interferes

with normal patterns of fish migration or which accumulates in sediments or biological tissues to the detriment of fish, wildlife or their predators.

4. Consent conditions for these parameters for discharge to municipal treatment plants can be established with the Licensing Authority, and different values may apply.

5. Reduction in relation to influent load. Total nitrogen means the sum total of Kjeldahl-nitrogen plus nitrate-nitrogen plus nitrite-nitrogen.

6. Determination of limits at the time of licensing based on consideration of appropriate technologies and the requirement of the receiving environment. In this regard particular attention should be paid to the maximum acceptable concentration standards (wherever relevant and applicable) for the chemical parameters of;

(a) S.I. 293 of 1988 - European Communities
(Quality of Salmonid Waters) Regulations, 1988.

(b) S.I. 294 of 1989 - European Communities
(Quality of Surface Water intended for Abstraction of Drinking Water intended for Human Consumption) Regulations, 1989.

(c) S.I. 200 of 1994 - European Communities
(Quality of Shellfish Waters) Regulations, 1994.

6. COMPLIANCE MONITORING

The methods proposed for monitoring the emissions from these sectors are set out below.

6.1 EMISSIONS TO AIR

1. Periodic monitoring of dust and metals as per licence.

6.2 EMISSIONS TO WATER

1. Daily monitoring of flow and volume, continuous monitoring of pH. Monitoring of other relevant parameters as deemed by the Agency taking account of the nature, magnitude and variability of the emission, and the reliability of the control technologies.

3. Monitoring of influent and effluent from the waste water treatment plant to establish % BOD and Suspended Solids reduction and early warning of any difficulties in waste water treatment plant, or unusual loads.

4. The potential for the treated effluent to have tainting or toxic effects should be assessed and if necessary measured by established laboratory techniques.

6.3 SOLID WASTE MONITORING

1. The recording in a register of the types, quantities, date and manner of disposal of all wastes.

2. Leachate testing of sludges and other material as appropriate being sent for landfilling.

3. Annual waste report showing efforts made to reduce specific consumption together with material balance and fate of all waste materials.

APPENDIX 1

SOURCES AND EMISSIONS

1. INTRODUCTION

In this section, the major sources of emissions to air and water are identified, as are the principal sources of waste from the sector. It should be borne in mind that the identified list of sources is not all encompassing, nor will every plant falling within an individual sector have every one of the emissions which are associated with the sector as a whole.

Emissions are considered under the following headings: fugitive and unscheduled emissions, and specific process emissions. Some of the process emissions may be considered to have little potential environmental significance and these are designated as minor (m). (In specific plants, the designation of emissions as minor will be made on an individual basis during the licensing process).

2. SOURCES OF EMISSION TO AIR (SYMBOLS REFER TO TABLE A1)

- Drill rigs (S1).
- Blasting (S2).
- Quarry surfaces (S1).
- Stockpiles (S1).
- Filling, transport and emptying of load haul dump trucks and front end loaders (S1).
- Mechanical size reduction (S1).
- Mechanical classification (S1).
- Physio-chemical extraction (S3).
- Press Filter (S4).
- Conveyors (S1).
- Off-site transport (S1).
- Tailings (S1).

- Earthmoving (S1).
- Waste and storage (S1).
- Temporary mineral storage (S1).
- Primary crushing (underground) (S1).
- Vent raises (S4).
- Mineral transport to surfaces (m).

3. SOURCES OF EMISSIONS TO WATER (SYMBOLS REFER TO TABLE A2)

- Contaminated stormwaters (E1).
- Machinery area (E2).
- Leaching from open surfaces and stockpiles (E1 & E3).
- Site dewatering (E1).
- Vehicle wheel and body wash (E1 & E2).
- Water table reduction (E1 & E5).
- Site water control (temporary lagoons, sedimentation ponds, stormwater control) (E1).
- Recovery filtrate (E1).
- Abatement systems (E1).
- In-mine dewatering (E1 and E2 & E5).
- Tailings (E1, E3 & E4).
- Backfill run-off (E1 & E3).
- Laboratory effluent (m).
- Domestic sewage (m).
- Leaching from open surfaces and stockpiles (E1 & E3).

4. SOURCES OF WASTE

- Sludges from WWTP (W1).
- Contaminated drums, equipment, packaging and protective clothing (W2).
- Dust from abatement plant (W3).
- Tailings (W4).
- Spent adsorbents (W5).
- Plant maintenance (W6).
- Waste rock, soil, etc. (m).

Table A1 - Summary of Sources and Emissions to Air
(Symbols refer to Section 2 in Appendix)

Source	Emissions
S1	Dust
S2	Dust Explosive Fumes (minor)
S3	Minerals Chemicals (minor) Impurities (minor)
S4	Dust Truck and Compressor Exhausts (minor) Blasting Fumes (Hydrogen sulphide)

Table A2 - Summary of Sources and Emissions to Water
(Symbols refer to Section 3 in Appendix)

Sources	Emissions

E1	Suspended Solids Dissolved Inorganics
E2	Lube Oils
E3	Acids/Alkalis
E4	Organics
E5	Oxygen deficient/CO_2 Rich

Table A3 - Summary of Other Releases
(Symbols refer to Section 4 in Appendix)

Source	**Emission**
W1	Organics (BOD) and/or Inorganics (incl. suspended solids and minerals) Oils/Fats/Grease
W2	Process and Treatment Plant Chemicals Mineral Dust Contamination
W3	Mineral Dust
W4	Mineral Dust Process Chemicals
W5	Activated carbon Zeolite Resins
W6	Lube oil, grease, brake linings, etc.

APPENDIX 2

PRINCIPAL REFERENCES

1. Ireland

1.1 Local Government (Water Pollution) Act 1977;
(Control of Hexachlorocyclohexane and Mercury Discharges)
Regulations (S.I. 55 of 1986).

1.2 Local Government (Water Pollution) Act 1977;
(Control of Cadmium Discharges) Regulations (S.I. 294 of 1985).

1.3 European Communities (Quality of Salmonid Waters) Regulations,
(S.I. 293 of 1988).

1.4 European Communities (Quality of Water Intended for the Abstraction of
Drinking Water) Regulations (S.I. 294 of 1989).

1.5 Wildlife Act 1976 (Protection of Wild Animals) Regulations
(S.I. 112 of 1990).

1.6 Local Government (Water Pollution) Regulations
(S.I. 271 of 1992).

1.7 European Communities (Quality of Shellfish Waters) Regulations
(S.I. 200 of 1994).

2. U.S.

2.1 Field and Laboratory Methods Applicable to Overburden and Minesoil
(U.S. Department of Commerce, March 1978, PB-280 495).

2.2 Progress in Ground Water Protection and Restoration
(U.S. EPA, February 1990, EPA 440/6-90-001).

2.3 Estimating Releases and Waste Treatment Efficiencies for the Toxic
Chemical Release Inventory Form (U.S. EPA, December 1987, Contract
No. 68-02-4248).

3. E.C.

3.1 Study of Noxious Effects of Dangerous Substances Recorded in List II (Council Directive of 4 May 1976). Dangerous Substances Discharged into the Aquatic Environment of the Community (Biokon Aps, Final Report, 1979 (Env/223/74-EN, Rev.3).

4. Canada

4.1 The Use, Characteristics and Toxicity of Mine Mill Reagents in the Province of Ontario (Ontario Ministry of the Environment, 1977).

5. Germany

5.1. T.A. Luft (1986).

APPENDIX 3

I.P.C. Licensing Information
Published by the Environmental Protection Agency

LC1/94	Integrated Pollution Control Licensing - Guide to Implementation and Enforcement in Ireland	£1.50
LC2/94	Integrated Pollution Control - Summary of Licensing Procedures	No charge
LC3/95	Environmental Protection Agency - Summary of its Structures Powers and Functions	No charge
LC4/94	Integrated Pollution Control (IPC) Licensing Fees	No charge
LC5/94	Environmental Protection Agency Act, 1992 (Noise) Regulations, 1994.	No charge
LC6/95	BATNEEC Guidance Note for the Chemical Sector	£5.00
LC7/95	BATNEEC Guidance Note for the Waste Sector	£5.00
LC8/95	Guidance Note for Noise in Relation to Scheduled Activities	£3.00
LC9/95	Aspects of Licensing Procedures - Objections. Oral Hearing	£1.50
LC10/95	Fire-Water Retention Facilities (Draft) Guidance Note to Industry on the Requirements for Fire-Water Retention Facilities	£3.00
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LC13/96	BATNEEC Guidance Note for The Rendering of Animal By-products	£5.00
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LC15/96	BATNEEC Guidance Note for The Poultry Production Sector	£5.00

LC16/96	BATNEEC Guidance Note for The Pig Production Sector	£5.00
LC17/96	BATNEEC Guidance Note for The Slaughter of Animals	£5.00
LC18/96	BATNEEC Guidance Note for The Manufacture of Sugar	£5.00
LC19/96	BATNEEC Guidance Note for Electroplating Operations	£5.00
LC20/96	BATNEEC Guidance Note for The Manufacture of Integrated Circuits & Printed Circuit Boards	£5.00
LC21/96	IPC Licensing & Control Annual Report, 1995	£5.00
LC22/97	BATNEEC Guidance Note for The Manufacture or Use of Coating Materials	£5.00
LC23/97	Information Leaflet on Intensive Agriculture	No charge
LC24/97	IPC Licensing & Control Annual Report, 1996	£5.00
LC25/97	BATNEEC Guidance Note for Wood Treatment and Preservation	£5.00
LC26/97	BATNEEC Guidance Note for Manufacture of Synthetic Fibres	£5.00
LC27/97	BATNEEC Guidance Note for Textile Finishing	£5.00
LC28/97	BATNEEC Guidance Note for Boilermaking and Manufacture of Sheet Metal Containers	£5.00

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