



An Ghníomhaireacht um Chaomhnú Comhshaoil

Integrated Pollution Control Licensing

Batneec Guidance Note
For The
Manufacture of Sugar

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.*

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Batneec Guidance Note For The Manufacture of Sugar

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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.

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Advisory Committee, E.P.A.
County & City Engineers Association
Department of Agriculture, Food and Forestry
Department of Enterprise and Employment
Department of the Environment
Department of Health
Department of the Marine
Irish Business and Employers Confederation
Irish Meat Processors
Irish Veterinary Association
Teagasc

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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.

It should be noted at the outset, that noise is not included within the scope of this work and guidance on this parameter has been issued separately.

This Guidance Note is comprised of six main sections and two 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. Section 6 contains comments on compliance monitoring requirements. Appendix 1 gives the main sources of emissions, and the principal releases from such sources while Appendix 2 contains a listing of IPC publications to date.

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 I.P.C. 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 technologies 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 7.6 of the activities specified in the First Schedule to the EPA Act 1992. These are:

7.6 *The manufacture of sugar.*

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.
- **Substitution** of materials (e.g. low sulphur fuel) by environmentally less harmful ones.
- Demonstration of waste **minimisation** 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, 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 HSA) 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).

- Sulphur reduction by using boiler gases for direct drying.
- Inventory control.
- Optimisation of water usage.
- Dry equipment cleaning and dry vacuum systems, where feasible.
- Separation of cooling water, storm water and process effluents of different origin in order to permit appropriate treatment options.

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 materials (excluding beet and bulk liquids), storage, handling, processing and transfer within a suitable building.
- Closed storage and transfer systems for milled material, raw material, etc.
- Bunding of tanks.
- Overground pipelines and transfer lines.
- Only totally enclosed conveyors to be used for dusty materials.
- Check system to avoid acceptance of improper materials and to ensure "first-in-first processed".
- Overfilling protection on bulk storage tanks.
- Heat recovery to be used where practicable e.g. boiler gases for drying.
- Local extract systems as appropriate e.g. drier, mill, cookers, diffusers, etc.
- Condensers on all appropriate process equipment e.g. evaporators, vacuum pans, etc.
- Lime handling to be carried out in a suitably controlled manner to contain dust emissions.

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 process wastes and sludges (e.g. lime, pulp, molasses, sand, vegetable fines, etc.)
- Recovery of water vapour for reuse.

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).

- Condensation (T1).
- Filtration (fabric filters normally adequate) (T2).
- Cyclones (T3).
- Scrubbers (T4).

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 (F2).
- Sedimentation/filtration/floatation (F3).

4.6.2 Secondary Treatment

- Biofilters (F4).
- Anaerobic treatment (F5).
- Activated sludge/aeration lagoons (F6).
- Extended aeration (F7).
- Nitrification/denitrification (F8).

4.6.3 Tertiary Treatment

- Filtration/coagulation/precipitation (F9).

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.
- Dissolved air floatation.
- Filtration.
- Centrifugation.
- Sludge digestion.
- Drying.

4.7.2 Disposal

- Reuse of process waste for animal feed and downstream processing.
- Engineered landfill of wastes.
- Landspreading of wastes (as fertiliser).
- Land reclamation/soil conditioning (e.g. sand, soil, etc.)

Table 4.1 - Summary of Technologies for Treating Emissions to Air
(Symbols refer to section 4.5)

Emission Type	Technology
Steam	T1
Particulates	T2, T3, T4

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

Emission Type	Technology
Organics	F2, F3, F4, F5, F6, F7
Suspended Solids	F2, F3, F9
Nitrates/Ammonia	F8, F7, F6, F5, F4
Alkali (e.g. lime)	F1

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 K; Pressure 101.3 kPa; no correction for water vapour content.

For combustion gases:

Temperature 273 K; Pressure 101.3 kPa; dry gas; oxygen content 11%.

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 Water

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
Total Particulate Matter	50 mg/m ³

5.4 RELEASES 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 (e.g. condensate for washing raw materials).

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.

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 40 mg/l	1,4
Toxic Units	5	2,4
Total Nitrogen(as N)**	>80% Removal or 15 mg/l	4,5
Total Phosphorus (as P)**	>80% Removal or 2 mg/l	4,5
Ammonia (mg/l as N)	10	4
Oils, Fats and Grease (mg/l)	15	4
Fish Tainting	No Tainting	3,4
Mineral Oil (Interceptor) (mg/l)	20	4

* 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 by any uncontaminated streams, e.g. stormwater, cooling water, 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 is defined as the average daily mass arising for treatment over any three month period.

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

2. The toxicity of the effluent shall be determined on an appropriate aquatic species. The number of Toxicity Units (TU) = 100/96 hr LC50 in percentage vol/vol. so that higher TU values reflect greater levels of toxicity.
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. COMPLIANCE MONITORING

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

6.1 EMISSIONS TO AIR

6.1.1 Periodic monitoring for particulates as per licence.

6.2 WASTE WATER DISCHARGES

6.2.1 Establish existing conditions prior to start-up, of key emission constituents, and salient flora and fauna.

6.2.2 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.

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

6.2.4 Periodic fish tainting and toxicity tests where appropriate taking account of the nature, magnitude and variability of the emission, and the reliability of the control technologies.

6.2.5 Periodic biodegradability checks where appropriate on effluents to municipal waste treatment plants, both prior to start-up and thereafter.

6.3 SOLID WASTE MONITORING

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

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

6.3.3 Annual waste minimisation 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 latter are 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

2.1 Fugitive and Unscheduled Emissions

- Particulates losses during delivery, storage, filling and emptying operations.
- Steam and odour losses from building, etc.

2.2 Process Emissions (Symbols refer to Table A1)

- Drier emissions (S1).
- Granulation emissions and bagging plant (S2).
- Evaporation emissions (S3).
- Extraction cooker (diffusion) emissions (S3).
- Screening (m).

3. SOURCES OF EMISSIONS TO WATER

3.1 Spills and Diffuse Sources etc.

- Contaminated stormwaters.
- Storage tank leaks.
- Pipework leaks.
- Spillages.
- Bund Drains.
- Leakages from flanges, pumps, seals, valve glands, etc.

3.2 Process Emissions (Symbols refer to Table A2)

- Beet washing (E1).
- Wheel washing of vehicles (where carried out) (E1).
- Condensate (evaporation) (E2).
- Boiler blowdown (m).
- Contaminated water arising from production process and cleaning of plant (E1).
- Effluent from abatement systems (condensers, scrubber) (E2).
- Laboratory effluent (m).
- Storage area/tanks/skips/haulage vehicles etc. washdown (E1).

4. SOURCES OF WASTE (Symbols refer to Table A3)

- Sludges from WWTP (W1).
- Contaminated drums, equipment, packaging and protective clothing (W2).
- Spent material from production process (W3).
- Sludges from interceptors (W4).
- Purification sludge (W5).

Table A1 - Summary of Sources and Emissions to Air

(Symbols refer to Section 2.2 of this Appendix)

Source	Emissions
S1	Odours (minor) Steam Particulates
S2	Particulates Odours (minor)
S3	Odours (minor) Steam

Table A2 - Summary of Sources and Emissions to Water

(Symbols refer to Section 3.2 of this Appendix)

Sources	Emissions
E1	Suspended Solids Organics (BOD and Nitrogen) Lime
E2	Water Trace Organics

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

Source	Emission
W1	Organics (BOD) Inorganics
W2	Treatment Plant Chemicals
W3	Soil Spent Beet Vegetable fines Sand
W4	Suspended Solids
W5	Lime Trace Organics Salts

APPENDIX 2

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
LC11/96	BATNEEC Guidance Note for Board Manufacture	£5.00
LC12/96	BATNEEC Guidance Note for The Production of Cement	£5.00
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

These documents are available from EPA Publications, St. Martin's House, Waterloo Road, Dublin 4.

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