ENVIRONMENTAL PROTECTION AGENCY

BATNEEC GUIDANCE NOTE

Class 8.6

FELLMONGERING AND TANNING

(DRAFT 4)

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 seven main sections and an appendix. 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, while the principal references are given in Section 7.

The Appendix gives the main sources of emissions, and the principal releases from such sources.

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 8.6 of the activities specified in the First Schedule to the EPA Act 1992. These are:

8.6 The fell-mongering of hides and tanning of leather in installations where the capacity exceeds 100 skins per day.

4. CONTROL TECHNOLOGIES

4.1 INTRODUCTION

As explained in this 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 **prevent** emissions and **eliminate** wastes that might pose environmental problems.

- **Substitution** of materials / solvents etc. 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 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, they represent BATNEEC solutions when implemented in the appropriate circumstances. The circumstances depend on plant scale, chemicals 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 flammable/explosive vapours or dusts are handled, safety procedures (acceptable to HSA) 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).

- 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.
- Hide chilling to avoid salt in the effluent, where possible.
- Partial salt elimination before soaking.
- Hair recovery processes to reduce sulphide.
- Enzyme-assisted unhairing to reduce sulphide.
- CO_2 deliming to reduce ammonia in the effluent.
- Nitrogen free deliming agents to reduce ammonia and nitrogen in effluent.
- Better uptake/exhaustion of chrome e.g. high exhaust chrome tanning chemicals.
- Alternative mineral tanning agents to prevent chrome in the effluent or in the solid wastes (reserved for a few special types of leather).
- Water-based and solvent-free top coats to avoid VOC emissions.

4.3 CONTAINMENT 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. bulk liquids), storage, handling, processing and transfer within
  a suitable building.
- Secondary containment of building releases by maintenance of negative pressure within the building.
- Bunding of tanks.
- Overground pipelines and transfer lines.
- Check system to avoid mixing incompatible materials.
- Bunding of all stored materials with separate bunding for incompatibles.
- Prevention of rain ingress, wind entrainment etc. for stored materials.
- Local extract systems as appropriate e.g. pasting table, buffing.

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).

- Recycle of the degreasing agents.
- Chrome recovery/recycle to reduce chromium in the effluent.
- Pickling, sulphide and tanning liquor recycle.
- Separate aqueous phase drains from process buildings.
- On-site solvent recovery plants.
- Offsite solvent recovery.
- Reuse in another industry (e.g. food, photographic, pharmaceutical, glue, fertiliser, animal food.

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.)

- Biofilters as final air treatment (T1).
- Selective chemical reaction scrubbers, e.g. acid scrubber for ammonia prior to biofilter (T2).
- Bag filters (T3).
- Vapour incineration - catalytic and/or regenerative for non-chlorinated VOC streams arising from certain finishing operations. (Incinerator emissions are the subject of a separate note). (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 environmental site constraints).(Symbols refer to Table 4.2)

4.6.1 Pre-Treatment

- Precipitation (F1).
- Oxidation (F2).

4.6.2 Primary Treatment

- pH Correction/neutralisation (F3).
- Coagulation/flocculation/precipitation (F4).
- Sedimentation/filtration/floatation (F5).
- Centrifugation (F6).

4.6.3 Secondary Treatment

- Biofilters (F7).
- Anaerobic treatment (F8).
- Activated sludge/aeration lagoons (F9).
- Extended aeration (F10).
- Nitrification/denitrification (F11).

4.6.4 Tertiary Treatment

- Filtration/coagulation/precipitation (F12).

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

- Engineered landfill of wastes.
- Landspreading of wastes (as fertiliser) subject to biocide and metal levels.
- Recycle of process wastes to other industries.

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

Emission Type	Technology
Odours (incl. sulphides and mercaptans)	T1, T2, T4
Organics	T1, T4
Ammonia	T2, T4
Sulphide	T2, T1, T4
Particulates	T3
Acid Vapours	T2

VOC	T1, T4

Table 4.2 - Summary of Technology for Treating Water Emissions (Symbols refer to section 4.6)

Technology	Emissions
Organics	F1, F4, F5, F6, F7, F8, F9, F10
Biocides	F7, F8, F9, F10
Oils/Fats/Grease	F4, F5
Dyestuffs	F4, F7, F8, F9, F10
Ammonia/Nitrates	F11
Sulphide	F2, F9, F10
Chromium	F1, F4, F5, F12
Acids/Alkali	F3
Phosphorus	F12

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% (dry) for liquid and gaseous fuels, 6% (dry) 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

Table 5.1 contains the emission limit values for discharges to air.

Table 5.1 - Emission Limit Values for Emissions to Air

Substance	Concentration Limit
Total Particulates	50 mg/m^3
VOCs (degreasing)	50 mg/m^3
VOCs (finishing)	75 g/m^2 product produced
Total hydrogen sulphide, sulphides and mercaptans (as S)	5 ppm v/v
Ammonia	40 ppm v/v
Acid vapours (Chrome Recovery or Chromium Reduction using Glucose)	30 mg/Nm^3 (as HCl)

Note 1: Achievement of ELV concentrations by the introduction of dilution air is not permitted.

Note for Table 5.1

1. Where organic substances of several classes are present, in addition to the above limit, the sum of Classes 1 & 2 shall not exceed the Class 2 limit and the sum of Classes 1, 2 & 3 shall not exceed the Class 3 limit etc.

2. Fugitive solvent emissions should comply with the requirements of proposed E.C. Solvent Directive or licence as appropriate.

3. It should be noted that at the time of licensing - emissions which fall below the Mass Emission threshold may be considered to minimise these as much as possible.

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.

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 below.

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** 100 mg/l	1,4
Total Ammonia (mg/l as N)	20	4
Total Nitrogen (as N)**	>80% Removal **or** 15 mg/l	4,5
Total Phosphorus (as P)**	>80% Removal **or** 3 mg/l	4,5
Oils, Fats, and Grease (mg/l)	15	4
Fish Tainting	No Tainting	3,4
Mineral Oil (Interceptor) (mg/l)	20	4
EC List 1	As per 76/464/EEC and amendments	4
Chromium (mg/l as total Cr)	0.5	4
Chromium (mg/l as Cr VI)	0.1	4
Sulphide (mg/l as S)	1.0	4
Toxic units	10	2,4
Phenols (mg/l)	1	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. storm water, 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 discharges 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 Spot sampling at least once/day using e.g. chemical indicator tubes for ammonia and sulphides.

6.1.2 Annual monitoring for all parameters, except where organic solvent degreasing systems are used when monthly VOC measurements should be taken.

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 The potential for the treated effluent to have tanning and toxic effects should be assessed and if necessary measured by established Laboratory techniques.

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 (e.g. chromium and solvent).

7. PRINCIPAL REFERENCES

7.1 U.K. DEPARTMENT OF THE ENVIRONMENT.

7.1.1 Secretary of State's Guidance PG6/22(92)
(Leather Finishing Processes).

7.1.2 Secretary of State's Guidance PG 6/21(92)
(Hide and Skin Processes).

APPENDIX 1

MAIN 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). (However, obviously there could be specific plants where this designation of minor may not be correct. Such emissions must then be examined on a one-off basis).

2. SOURCES OF EMISSION TO AIR FROM:

2.1 Fugitive and Unscheduled Emissions

- Odour losses during storage, and during filling and emptying of process vessels.
- Stripping of odorous compounds from waste water treatment plants (WWTP) resulting in releases to air and/or odour problems.
- Leakages from flanges, pumps, seals, valve glands etc.
- Building losses (through door, window, etc.)

2.2 Process Emissions (Symbols refer to Table A1)

- Drier Emissions (S1).
- Dehairing (S1).
- Pickling (S2).
- Tanning (S3).
- Degreasing (S4).

- Other Finishing Processes (including ironing and buffing) (S5).
- Building ventilation gases (S6).
- Distillation vents (m).
- Material handling and storage (m).

3. SOURCES OF EMISSIONS TO WATER FROM:

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 Processes Emissions (Symbols refer to Table A2)

- Spent process liquors (E1)
- Rinse waters (E1)
- Laboratory effluent (m).
- Boiler blowdown (m)
- Contaminated water arising from cleaning of plant (E2).
- Effluent from abatement systems where used (e.g. ammonia and/or sulphide scrubber or sulphide oxidation plant) (E3).

4. SOURCES OF WASTE FROM: (SYMBOLS REFER TO TABLE A3)

- Sludges from WWTP (W1).
- Still bottoms residue from solvent recovery plants (m).
- Solid waste from fleshings, trimmings, reject skins and hides (W2).
- Tanning liquor metal precipitation (W3).
- Shake down dusts from filters (W5).
- Contaminated drums, filters, equipment, packaging and protective clothing (W4).
- Spent material from biosystem, where used (m).

Table A1 - Summary of Sources and Emissions to Air
(Symbols refer to section 2.2 of Appendix)

Source	Emission
S1	Sulphides and mercaptans
S2	Ammonia Sulphuric acid (m) Formic acid; Formates (m)
S3	Acid vapours (Chrome recovery) Chromium (m)
S4	VOCs (white spirit)
S5	VOCs e.g. (Formaldehyde, toluene, acetone, acetate) Dust
S6	Ammonia Sulphide General Odours (incl. sulphides and mercaptans) Formaldehyde and white spirit (m).

Table A2 - Summary of Sources and Emissions of Effluent
(Symbols refer to section 3.2 of Appendix)

Source	Effluent
E1	Organics (BOD) Inorganics (e.g. lime, ammonia, sulphide, chromium, sulphate, salt) Biocides Oils, fats, grease Dyestuffs
E2	Organics (BOD) Inorganics (e.g. low levels of lime, ammonia sulphide, sulphate, salt)
E3	Ammonia Sulphide Organics (BOD

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

Source	Waste
W1	Lime Biological solids Chromium Sulphide Ammonia Oils/fats/grease Trace Biocides
W2	Proteins Fats
W3	Chromium
W4	Ammonia Sulphide Sulphuric Acid Treatment plant chemicals Formic acid/formates Biocides
W5	Leather dust Hair