An Ghníomhaireacht um Chaomhnú Comhshaoil

Integrated Pollution Control Licensing

Batneec Guidance Note
For Electroplating Operations

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
Ardcavan, Wexford
Telephone : +353-53-47120 Fax : +353-53-47119

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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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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 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. Section 6 contains comments on compliance monitoring requirements.

Appendix 1 gives the principal references, Appendix 2 details the main sources of emissions and the principal releases from such sources and Appendix 3 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 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 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 12.3 of the activities specified in the First Schedule to the EPA Act, 1992. These are:

12.3 Electroplating operations.

4. CONTROL TECHNOLOGIES

4.1 INTRODUCTION

As explained in Section 2, this Guidance Note identifies BATNEEC for a new activity, but obviously does so in the absence of site-specific information. Accordingly, it represents the minimum 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 / 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 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, these measures represent BATNEEC solutions when implemented in the appropriate circumstances. The circumstances depend on plant scale, chemicals used, type of plating, 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).

- Inventory control.
- Optimisation of water usage.
- Water based cleaning systems to be selected instead of solvent based systems.
- Separation of cooling water, storm water and process effluents of different origin in order to permit appropriate treatment options.
- Except where unavoidable, the following shall not be used:
  (i) Halogenated substances.
  (ii) White spirits, aromatic solvents and solvent dying.
  (iii) Carcinogens (R45 risk phrase under EC Directive 67/548/EEC).
  (iv) Chlorine based oxidising substances e.g. hypochlorite.
- Raw materials shall be investigated for their potential contribution of EC List 1 substances to aquatic discharges. Alternatives shall be sought for those with such potential.
- In-plant measures to extend the service life of plating baths e.g. filtration, activated carbon treatment, crystallisation, selective electrolysis, ion-exchange etc.
- Degreasing bath-life to be extended by e.g. mechanical filtration, oil-skimming devices and ultra-filtration.
- Pickling bath maintenance to include e.g. liquid-liquid extraction, electrodialysis, ion exchange and retardation processes.
- If technically possible, substitution of hazardous substances (e.g. cyanide, cadmium, ammonia, mercury, EDTA and similar sequestering and chelating agents, nonylphenolethoxylates, chlorinated organics) by substances which are readily biodegradable, non-bioaccumulating, non-mutagenic and have a low toxicity.
- EDTA should be substituted in degreasing baths, stripping baths and chemical nickel-plating baths. Possible substitutes include e.g. citric acid, tartaric acid and gluconic acid; where substitution proves impracticable, recovery of EDTA should be carried out from chemical copper plating baths (e.g. by precipitation as H_4EDTA) and their rinse baths (e.g. by precipitation after a concentration step, e.g. by anion exchange).
- Substitution of processes generating hazardous substances wherever possible (e.g. cyanide oxidation with hypochlorite).
- Multiple use of counter-current rinse waters, at least three rinsing steps should be applied. Suitable techniques to keep more than 90% of the drag-out in a small volume for recovery/recycling are e.g.
  (i) 3-stage cascade rinsing;
  (ii) 2-stage cascade rinsing plus closed cycle rinsing with ion exchange;
  (iii) Combined dip/spray/mist rinsing techniques.
  If possible these rinsing concentrates should be returned into the process baths, if necessary after specific treatment/concentration. By applying these rinsing techniques process baths can often be operated as closed water/low waste systems.
- Drag-out minimisation by e.g.

- adequate drip-off time.
- air jetting and brushing.
- suction (bulk articles).
- shaking (rack articles).
- Rack maintenance.
- Correct design of parts and their suspension on the racks to ensure liquid entrapment is minimised.
- Use of splash guards.

- Spray applications to be selected instead of bath immersion where appropriate.
- Ultrasonic cleaning and electro-cleaning.
- Shot blasting is preferred to sand blasting.
- Iron phosphating is preferred to zinc phosphating.

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 process materials, storage and handling within a suitable building.
- Bunding of tanks.
- Single controlled emission point for all large dedicated plants.
- Overground pipelines and transfer lines.
- Check system to avoid mixing incompatible materials.
- Bunding of all stored materials with separate bunding for incompatibles.
- Overfilling protection on bulk storage tanks.

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 process liquors e.g. separation of suitable non-ferrous metal waste water streams to carry out internal recycling (e.g. by electrolysis) or external recovery (e.g. by non-ferrous metal industry).
- Reuse in another industry.
- Onsite materials recovery.
- Material recovery to be optimised by such means as ultrafiltration; reverse osmosis; electrodialysis; electrolysis; ion-exchange; crystallisation and evaporation.

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).

- Cyclones (T1).
- Bag filters (T2).
- Vapour incineration (thermal, catalytic and regenerative) (T3).
- Wet chemical scrubbers (T4).
- Carbon adsorption (T5).

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).

4.6.1 Pre-Treatment

- Precipitation (F1).
- Oxidation (F2).
- Reduction (F3).
- Reverse osmosis (F4).
- Electrodialysis (F5).
- Electrolysis (F6).
- Ion exchange (F7).
- Evaporation (F8).
- Ultrafiltration (F9).

4.6.2 Treatment

- pH Correction/neutralisation (F10).
- Coagulation/flocculation/precipitation (F11).
- Sedimentation/filtration/flotation (F12).

4.6.3 Polishing

- Resin beds (F13).
- Reverse osmosis (F14).

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
- Filtration

4.7.2 Disposal

- Engineered landfill.
- Recovery and reuse in downstream processing or another industry.
- Waste encapsulation.

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

Emission Type	Technology
Particulates	T1, T2
Acids, Alkalis, Cyanides	T4
VOCs	T3, T5

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

Emission Type	Technology
Acids, Alkali	F10
Metals	F1, F3, F4, F5, F6, F7, F8, F9, F11, F12, F13, F14
Suspended Solids	F11, F12
Cyanides	F2
Ammonia	-
Phosphates	F11

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.

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

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.

Table 5.1 - Emission Limit Values for Emissions to Air

Constituent Group or Parameter*	Class	Mass Flow Threshold for ELV	Emission Limit Value ($mg/m^{3)}$**)
Carcinogenic Substances	T.A. Luft 1 T.A. Luft 2 T.A. Luft 3 Substances (other than those above) with R45 designation)	> 0.5 g/hr >5.0 g/hr >25.0 g/hr >0.5 kg/hr	0.1 1.0 5.0 5.0
Inorganic Dust Particles	T.A. Luft 1 T.A. Luft 2 T.A. Luft 3	>1 g/hr >5 g/hr >25 g/hr	0.2 1.0 5.0
Vaporous or Gaseous Inorganic Substances	T.A. Luft 1 T.A. Luft 2 T.A. Luft 3 T.A. Luft 4	>10 g/hr >50 g/hr >0.3 kg/hr >5.0 kg/hr	1 5 30 500
Organic Substances with Photochemical Ozone Creation Potential - POCP	U.K. AEA 1 U.K. AEA 2	>0.5 kg/hr >2.0 kg/hr	20 50
Organic Substances (Note 2)	T.A. Luft 1 T.A. Luft 2 T.A. Luft 3	>0.1 kg/hr >2.0 kg/hr >3.0 kg/hr	20 100 150
General Dusts		<0.5 kg/hr >0.5 kg/hr	150 50

*Where a substance falls into more than one category in Table 5.1, the lower emission limit value applies.

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

Notes for Tables 5.1

1. The Mass Flow is calculated in kg/hr for the raw gas and is determined at the point before any gas cleaning or abatement plant, but after any devices inherent in the process (e.g. after reactor overhead condensers; after product cyclones etc.) . Mass Flow is the maximum emission which can occur over any one hour period of plant operation, from the entire site.

   Where the mass flow exceeds the mass threshold given in the Guidance Note, then abatement will be required down to the appropriate emission limit value (ELV), unless the concentration of the raw gas is already below the ELV, in which case no further abatement is required.
   (In other words, if the raw gas concentration is below the ELV, the mass flow is not relevant)

   Stack Height will be based on :

   a) Mass Flows as emitted from the stack

      in those cases where,

      (i) Failure of the abatement system results in process shutdown.

   or (ii) Failure of the abatement system will not result in significant risk to health or environmental damage.

   or (iii) No abatement system exists.

   b) Mass Flow of the Raw Gas prior to gas cleaning and abatement system in those cases where :

      (i) Failure of the abatement systems results in continuing discharges,

   and (ii) Such discharges pose significant risk to health or the environment.

2. Where 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.

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

4. It should be noted that, at the time of licensing, emissions which fall below the Mass Emission threshold may still be considered in order 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 a sewer, will also 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	2
BOD(mg/l)	25	2
Number of Toxicity Units	5	1,2
Total Nitrogen (as N)**	> 80% Removal **or** 15 mg/l	2,3
Total Phosphorus (as P)**	> 80% Removal **or** 2 mg/l	2,3
Total Ammonia (mg/1 as N)	10	2
Oils, Fats & Grease (mg/1)	10	2
Organohalogens (mg/l as Cl)	0.1	2
Phenols (mg/l)	1.0	2
Mercury (mg/1)	0.05	2
Nickel (mg/l)***	0.5	2
Silver (mg/l)	0.1	2
Lead (mg/l)***	0.5	2
Chromium (mg/l as Cr VI) Chromium (mg/l as total Cr) ***	0.1 0.5	2 2
Cadmium (mg/l)	0.05	2
Tin	2	2
Zinc (mg/l)***	0.5	2
Copper (mg/l)***	0.5	2
Mineral Oil (mg/l) (Interceptors)	20	2
EC. List 1	As per 76/464/EC and amendments	-
Mineral oils (mg/l) (Effluent Treatment)	1.0	2
Cyanide	0.2	2

***** 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 water.

******* Where the sum of the metals combined is less than 200 g/d prior to treatment, the emission limit values above may be increased fourfold.

Notes for Table 5.2:

1. 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.

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

3. 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 stack sampling as required by licence, taking account of the nature, magnitude and variability of the emission, and the reliability of the control technologies.

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 an early warning of any difficulties in waste water treatment plant, or unusual loads.

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

PRINCIPAL REFERENCES

1. PARCOM

1.1 Best Available Technology for the Minimisation of Pollutant Emissions and for Waste Water Treatment in the Electroplating Industry (1992).

1.2 Recommendation 92/4 on the Reduction of Emissions from the Electroplating Industry (1992).

2. Germany

2.1 T.A. Luft (1986).

APPENDIX 2

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 (Symbols refer to Table A1)

- Vapour losses during storage, filling and emptying of tanks.
- Leakages from flanges, pumps, seals, valve glands etc.
- Building losses (through door, window, etc.).
- Stripping of volatile compounds from WWTP resulting in releases to our and/or odour problems.

2.3 Process Emissions

- Pretreatment e.g. degreasing, cleaning, etc. (S1).
- Plating (S2).
- Post plating treatment (S3).
- Stripping (S4).
- Phosphating (S5).

3. SOURCES OF EMISSIONS TO WATER (Symbols refer to Table A1)

3.1 Spills and Diffuse Sources etc.

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

3.2 Processes Emissions

- Spent plating and treatment liquors (E1).
- Wash waters (E1).
- Scrubber and abatement system liquors (E2).
- Laboratory effluent (m).
- Boiler blowdown (m).
- Process water treatment plant liquor (m).

4. SOURCES OF WASTE

- Spent solutions (W1).
- Sludges from WWTP's and abatement systems (W2).
- Still bottoms residue from solvent cleaning (W3).
- Contaminated drums, filters, equipment, packaging and protective clothing (W4).

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

Source	Emission
S1	Acids Alkalis VOCs Particulates
S2	Acids Alkalis Metals Cyanides
S3	Acids Alkalis VOCs Steam
S4	Acids Alkalis Cyanides
S5	Acid

Table A2 - Summary of Sources and Effluent
(Symbols refer to Section 3 of this Appendix)

Source	Effluents
E1	Acids Alkalis Metals Suspended Solids Oils (minor) Cyanides Ammonia Phosphates
E2	Acids Alkalis Metals Oils (minor)

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

Source	Waste
W1	Acids Alkalis Metals Suspended Solids Oils Cyanides Ammonia Phosphates
W2	Metals Phosphates Oils
W3	Polymeric Residues
W4	Process and treatment plant chemicals

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
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Telephone: +353-1-660251