ENVIRONMENT AND HERITAGE SERVICE

GUIDANCE FOR PROCESSES PRESCRIBED FOR AIR POLLUTION CONTROL BY THE CHIEF INDUSTRIAL POLLUTION INSPECTOR

CHIEF INSPECTOR'S GUIDANCE TO INSPECTORS (PART B PROCESSES)

FURNACES FOR THE EXTRACTION OF NON-FERROUS METAL FROM SCRAP

B PROCESS GUIDANCE NOTE - GNB 2/2 VERSION 1

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1. INTRODUCTION

This Note is issued by the Chief Industrial Pollution Inspector as one of a series providing guidance for processes prescribed for Air Pollution Control (APC) by the Chief Inspector in Regulations made under the Industrial Pollution Control (Northern Ireland) Order 1997.

A further series of Notes is produced by the Department of the Environment (NI) for those processes prescribed for air pollution control and subject to regulation by the District Councils.

This Note provides a guide on standards and techniques to Inspectors in their assessment of an application for, or variation of, an APC authorisation under the Order.

This Note will also be of interest to operators of such processes, however it should be understood that whether an authorisation is granted, and on what conditions, will depend on the particular circumstances of each application. Parameters such as individual process characteristics and site location may influence the nature of the conditions that are included in an authorisation.

A key objective of the legislation is to ensure that, in carrying on a prescribed process, the best available techniques not entailing excessive cost (BATNEEC) will be used -

(i) for preventing the release of prescribed substances into the air or, where that is not practicable by such means, for reducing the release of such substances to a minimum and for rendering harmless any such substances which are so released; and

(ii) for rendering harmless any other substances which might cause harm if released into the air.

This Note comprises guidance in relation to new and existing processes and is based on an assessment of best available techniques as qualified by the requirement not to entail excessive cost. (The definition and meaning of BATNEEC is contained in the Industrial Pollution Control Part A and B processes "A Practical Guide".)

The guidance contained in this Note is based on the current state of knowledge and understanding of these processes, their potential impact on the environment, and the available control techniques at the time of publication. The guidance will be updated regularly, (as a minimum the Note will be reviewed at not more than four yearly intervals from the date of publication), to reflect changes in knowledge and understanding. It will not always be possible to revise the Notes quickly enough to keep in absolute step with rapid changes. It is therefore recommended that operators and their advisors check with the Inspectorate as to whether there have been any changes before relying on this Note for the purpose of making an application or taking other significant action under the Order.

2. PROCESS DEFINITION

2.1 This Note applies to processes where non-ferrous metal is extracted from scrap and where the aggregated design holding capacity of molten metal is at least 0.5 tonnes but less than 5 tonnes as described in Schedule 1 - Section 2.2, Part B of the Industrial Pollution Control Order (Prescribed Processes and Substances) Regulations (Northern Ireland) 1998.

2.2 These processes are normally undertaken in a dry or sloping hearth furnace, and in a few cases in a reverberatory furnace. The metals most frequently extracted are aluminium and zinc from irony aluminium scrap. There are two distinct sub-sectors which are recognised in this Note which undertake similar activities. The first of these involves melting scrap metal and casting into ingots which are subsequently remelted for compositional adjustment. This activity is known as "remelt". The second sub-sector involves the melting of remelt ingot, scrap or a mixture of those

materials, adjusting the composition of the metal in the furnace well, and casting into an ingot of known specification. This activity is known as “spec melt”.

This Note is primarily intended to cover metal recycling facilities which physically treat mixed scrap, and recover the metal. For aluminium or zinc foundries which do not recover aluminium or zinc by differential melting, GNB 2/4 (processes for melting and producing aluminium, magnesium and their alloys) or GNB 2/5 (zinc and zinc alloy processes), should be applied instead of this Note.

2.3 In the context of this Note “process” comprises the whole process including the treating, handling and storage of any materials used in the process as well as products and wastes produced by the process.

3. GENERAL REQUIREMENTS

3.1 New processes will be subject to the standards in the Note immediately.

3.2 It should be the aim to bring existing processes up to current standards whenever the opportunity arises. Account should be taken of the plant’s technical characteristics; it rate of utilisation and the length of its remaining life; the nature and amount of polluting emissions from it and the desirability of not entailing excessive costs for the plant concerned.

3.3 As part of the first application for the authorisation of existing processes, those areas of the process that require upgrading should be identified, and the possible techniques which are to be employed with the aim of attaining achievable releases for new processes, indicated. Under normal circumstances, a detailed programme for upgrading, including timetable, should be submitted with the application.

4. RELEASES INTO AIR

4.1 Reference Conditions

All pollutant concentrations from contained releases should be expressed at reference conditions of temperature 273K (0ºC) and pressure 101.3 kPa (1 atmosphere) without correction for water vapour content.

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

4.2 Emission Targets

4.2.1 The emission standards for all contained releases are as follows:-

Pollutant	**Concentration (mg/m^3)**
Total Particulate	20
Chloride (expressed as hydrogen chloride)	100
Total of Cadmium, Lead and their compounds (as metals)	2

4.2.2 In addition to these limits it may be necessary, depending on the circumstances, to set emission standards for of other pollutants, such as hydrogen fluoride or hydrogen cyanide.

4.2.3 Emissions to air should be free from visible smoke, apart from a minimum period (normally no more than a maximum of 30 minutes) at start-up from cold when the emission should not exceed Ringlemann Shade 1, as described in British Standard BS 2742: 1969.

4.2.4 All releases, other than steam or condensed water vapour should be free from persistent mist or fume and free from droplets.

4.2.5 The aim should be that all releases are free from offensive odour outside the process site boundary, as perceived by the Inspectorate.

4.2.6 The introduction of dilution air to achieve emission concentration limits in this Note should not be permitted. Certain types of filtration equipment may necessitate the introduction of cooling air. In such cases it will be necessary to correct measured emission concentrations for the diluting effect of the additional air volume.

5. RELEASE ROUTES

The principal release routes to air are as detailed below:-

Pollutant	**Source**
Particulate	Materials handling, furnace charging and de-ashing/cleaning
Hydrogen Chloride	Furnace emission

Pollutant (Contd.)	**Source (Contd.)**
Metals	Metals handling and furnace emission
Oxides of Sulphur	Furnace emission
Oxides of Nitrogen	Furnace emission
Oxides of Carbon	Furnace emissions

6. TECHNIQUES FOR RELEASE MINIMISATION

6.1 Introduction

The techniques selected need to cover releases from raw materials reception/storage, internal transportation, and from processing.

The process should be designed and operated in such a way that the substances released have the minimum impact on the environment. As a general principle the Inspectorate should be looking for evidence of the prevention, minimisation and rendering harmless of all releases of prescribed substances, and the rendering harmless of all other releases in the application, and requiring this in the authorisation.

Releases from the process may require a combination of several abatement techniques and the careful control of the process route taken in order to deal with the releases. The applicant should review all the options that are available and demonstrate that the combination of primary process and selected abatement equipment represents BATNEEC.

6.2 Techniques

6.2.1 The stocking, movement and handling of dusty materials, for example furnace residues, should be carried out in such a manner as to prevent emissions to the air.

6.2.2 The transportation and handling of ash and residues from the furnace should be carried out by methods which prevent emissions to the air. Dusty materials should be covered or contained when cool, but not dampened. Such materials should be handled under dry conditions and stored in clearly designated bays or containers.

6.2.3 Non-ferrous metals should be extracted in a suitable furnace equipped with a secondary combustion chamber, (e.g., a separate compartment away from the main melting chamber equipped with an additional burner or burners), with sufficient capacity to ensure efficient combustion of emissions to meet the necessary emission requirements in par. 4.2.1 and 4.2.5. Other equipment and techniques may be acceptable provided that it can be shown to the satisfaction of the Inspectorate that the resulting combustion related emission is as good as, or better than that achieved by an afterburner.

6.2.4 The furnace should only be operated when the secondary combustion chamber temperature, (where fitted), exceeds 1123K (850ºC) before the commencement of metal melting activity.

6.2.5 The secondary combustion chamber temperature should be continuously monitored and continuously recorded. An audible and visual alarm should be fitted which activates when the temperature falls below 1123K (850ºC).

6.2.6 The furnace exhaust should be ducted to suitable arrestment plant where necessary to meet the required emission standards specified in par. 4.2.1 and 4.2.5.

6.2.7 Enclosed furnaces, casings, ductwork, ancillary equipment and furnace doors should be made and maintained as gas-tight as is practicable. Emissions from charging operations should be prevented by careful selection of scrap and its introduction to the furnace. Where emissions cannot be prevented, local exhaust ventilation above the charging door discharging into the afterburner chamber should be provided. The furnace doors should be maintained in a closed position except for a minimum period during charging of scrap to the furnace.

6.2.8 Scrap material should be sorted prior to loading into the furnace to prevent the introduction of deleterious materials such as magnesium gearboxes, thermal break extrusions containing polyurethane foam, and fibre glass. Scrap feed items such as gearboxes should be drained of oil before introduction to the furnace.

6.2.9 **Dispersion from Chimneys & Vents**

6.2.9.1 The applicants will need to satisfy the Inspectorate that an appropriate assessment of vent and chimney heights has been made to provide adequate dispersion of prescribed substances, and other substances that might cause harm, which cannot be prevented and may be released. Some guidance is given in Technical Guidance Note D1 (ISBN 0-11-752794-7).

6.2.9.2 It may be necessary for dispersion modelling to be carried out which takes into account local meteorological data, local structures and topography, as well as other local releases, (for example, sites with any large volume emission, significant non-combustion sources or multiple release points and sites where there are sensitive receptors nearby).

6.2.9.3 Applicants should provide clear information on the parameters used and the assumptions made in their assessment, especially when using dispersion models. The assessment of background concentrations of pollutants will be particularly relevant. Statutory air quality standards and other recognised criteria should be taken into account.

6.2.9.4 Process upsets or equipment failure giving rise to abnormally high release levels over short periods should be assessed. Even if a very low probability of occurrence can be demonstrated by the applicant, a value for the chimney or vent height should nevertheless be set to avoid any serious damage to health in such circumstances.

6.2.9.5 The Operator should have procedures to reduce load or shut-down plant in the event of inadequate dispersion conditions.

6.2.9.6 Chimneys or process vents should be designed to provide efflux velocities that meet the requirements for stack aerodynamic downwash as described in Technical Guidance Note D1. Care should be taken to avoid generating positive pressure zones within the chimney unless the chimney wall is impervious or lined. Where a wet method of arrestment is used, the linear velocity within the arrestment equipment should not exceed 9 m/sec, to avoid entrainment of droplets.

6.2.9.7 Chimney flues, process vents and all ductwork should be leakproof. Chimney flues and ductwork leading to the chimney should be adequately insulated to minimise the cooling of waste gases and prevent liquid condensation on internal surfaces. Chimney flues and ductwork should be regularly cleaned to prevent accumulation of material.

6.2.9.8 Chimney or process vents should not be fitted with any restriction at the final opening, (for example a plate, cap or cowl), where it is necessary to achieve dispersion of the residual pollutants except for a cone to meet the efflux velocity requirements of par 6.2.9.6. The discharge should be vertically upwards.

6.2.9.9 In cases where only natural draught operates, chimneys should be designed to achieve the maximum possible efflux velocity consistent with chimney height and furnace characteristics. Emissions should not be deliberately cooled, in order to ensure maximum buoyancy and dispersion. It may be necessary to correct the chimney height to take into account the efflux velocity.

6.2.9.10 Where offensive odour is likely (or is present in the case of existing processes), outside the process site boundary, the assessment of chimney or vent height should take into account the need to render harmless residual offensive odour.

6.2.10 **General Operations**

6.2.10.1 Effective control of emissions requires the maintenance and proper use of equipment, as well as prudent supervision of process operations. Effective preventive maintenance should be employed on all plant and especially on the equipment concerned with the control of emissions to the air. Essential spares and consumable should be held or be available at short notice.

6.2.10.2 Any malfunction breakdown leading to abnormal emissions should be dealt with promptly and process operations adjusted until normal operations can be restored. All such malfunctions should be recorded in a log book retained by the operator for a minimum of 4 years and made available for examination by the Inspectorate. If there is likely to be an effect on the local community the Inspectorate should be informed without delay.

6.2.10.3 Staff at all levels should receive the necessary formal training and instruction in their duties relating to control of the process and emissions to air. Particular emphasis should be given to training for start-up, shut down and abnormal conditions.

6.2.10.4 A high standard of housekeeping should be maintained.

7. COMPLIANCE MONITORING PROGRAMME

7.1 General

Conditions in the authorisation should require the results of all monitoring to be recorded. It should further distinguish between:-

- compliance records;
- measurement or records for which regular formal returns to the Inspectorate are not normally required; and
- operational records made by the operator during the normal course of operating the process.

7.2 Monitoring Requirements

7.2.1 As part of proper supervision the operator should monitor emissions and make tests and inspections of the process. The need for and scope of testing and the frequency and time of sampling, will depend on local circumstances, operational practice, and the scale of operation. Testing should be undertaken under conditions of typical maximum operational loading.

7.2.2 Particulate emissions should be continuously monitored and continuously recorded to indicate performance of abatement plant. (By continuous indicative monitoring is meant monitoring to indicate the relative performance and/or process variation and therefore does provide data to demonstrate compliance with a numerical emission

standard.) The instruments should be fitted with audible and visual alarms which should activate at a reference level agreed with the Inspectorate. Emission events which lead to the alarms being activated should be automatically recorded. These monitors should be checked to ensure that they are functioning correctly in accordance with the manufacturer's instructions. Continuous emission charts and records should be retained by the operator for a minimum of 4 years and available for examination by the Inspectorate.

7.2.3 Particulate emissions should be tested at least once a year.

7.2.4 Emissions should be tested for hydrogen chloride, cadmium and lead and their compounds at least once a year. Where batch times exceed one hour, hydrogen chloride testing should be timed to coincide with the largest emissions. This will normally be the initial part of the batch cycle.

7.2.5 The frequency of testing should be increased, for example as part of the commissioning of new or substantially changed processes. Where the material processed may lead to the emission of other pollutants, (for example, other heavy metals), further testing may be necessary.

7.2.6 The results of all monitoring and inspections should be recorded in a log book, retained by the operator for a minimum of 4 years and available for examination by the Inspectorate. Adverse results including continuous monitor alarm events should be investigated immediately and in all cases should be recorded in the log book. The operator should ensure that the cause has been identified and corrective action taken, and this action recorded in the log book.

7.2.7 In any case where the emission measurement exceeds the emission requirements of par 4.2.1, the results should be forwarded to the Inspectorate immediately.

7.2.8 The results of all non-continuous emission testing should be forwarded to the Inspectorate as soon as practicable after completion of the sampling.

7.2.9 The sampling positions for all monitoring instruments should be agreed with the Inspectorate. Care is needed in the design and location of sampling systems in order to obtain representative samples.

7.2.10 The reference test method for particulate emissions in chimneys or ducts is that of British Standard BS 3405: 1983. Alternative methods of testing may be acceptable by agreement with the Inspectorate, provided that it can be shown that comparable results are obtained.

7.2.11 The concentration of other pollutants should be measured by methods agreed with the Inspectorate.

7.2.12 The onus is on the operator, that the appropriate equipment, laboratory facilities, expertise and quality control procedures are provided to ensure accurate results.

7.2.13 Efficient functioning of burners should be checked at least once a week and burners should be regularly maintained. The results of these checks should be recorded in the log book.

7.2.14 The Inspectorate should be advised at least 7 days in advance of any periodic monitoring exercise to determine compliance with emission limits, as well as the provisional time and date of monitoring, pollutants to be tested and the methods to be used.

7.2.15 **Environmental Monitoring**

Depending on the local circumstances the Inspector may require the works to monitor the effects of their operation on the surrounding neighbourhood by means of atmospheric sampling or other measurements. Such monitoring would be of a scope and frequency sufficient only to establish the level of any local environmental impact.