



**A GUIDANCE NOTE ON THE
BEST PRACTICABLE MEANS**

FOR

METAL RECOVERY WORKS

BPM 10

Environmental Protection Department
Air Management Group

March 1996

1.0 INTRODUCTION

1.1 This note is issued by the Environmental Protection Department as one of a series to provide guidance for the control of specified processes in Part IV of the Air Pollution Control Ordinance (the Ordinance). It is a guide in the assessment of an application for a licence under the Ordinance.

1.2 It should be understood that this note sets out the minimum requirement for the applicant to provide and maintain the best practicable means for the prevention of the emission of air pollutants. The applicant should recognize that whether a licence is granted or refused, and on what conditions, will depend on all the circumstances of an individual application, including this note.

1.3 The requirements in this note are applicable to the specified process of "Metal Recovery Works" described in Schedule 1 to the Ordinance as:

"Works in which scrap metals are treated in any type of furnace for recovery of metal with a processing capacity exceeding 50 kg per hour, where this is the primary object of the works."

2.0 EMISSION LIMITS

2.1 All emissions to air, other than steam or water vapour, should be colourless, free from persistent mist or fume, and free from droplets.

2.2 Smoke emissions from combustion processes should be less than Ringelmann Shade 1.

2.3 The concentration limits specified below apply to the emission from a furnace and other equipment (except incinerator) for the recovery of metals from scrap materials. All pollutant concentrations are expressed at reference conditions of 0⁰C temperature and 101.325 kPa pressure conditions without correction for water vapour or oxygen content. Introduction of dilution air to achieve the concentration limits is not allowed.

(a) The emission should comply with the following concentration limits with respect to particulates and heavy metals:

Particulates	50 mg/m ³
Lead and its compounds (as lead)	2 mg/m ³
Beryllium and its compounds (as beryllium)	0.002 mg/m ³
Total cadmium and mercury and their compounds (as metals)	0.2 mg/m ³
Total nickel and arsenic and their compounds (as metals)	1 mg/m ³
Total heavy metals (as metals)	5 mg/m ³

- (b) Where halogens and their compounds are emitted, the emission should also comply with the following concentration limits:

Hydrogen chloride	50 mg/m ³
Chlorine	30 mg/m ³
Fluorine and its compounds (as hydrogen fluoride)	10 mg/m ³

- 2.4 Where the metal recovery works includes incineration of any materials in an incinerator, the emission from the incineration process should comply with the following concentration limits. All pollutant concentrations are expressed at reference conditions of 0°C temperature, 101.325 kPa pressure, dry and 11% O₂ content conditions.

Particulates	50 mg/m ³
Sulphur dioxide	250 mg/m ³
Nitrogen oxides (as nitrogen dioxide)	400 mg/m ³
Carbon monoxide	100 mg/m ³
Chlorine and its compounds (as hydrogen chloride)	50 mg/m ³
Fluorine and its compounds (as hydrogen fluoride)	4 mg/m ³
Hydrogen bromide	5 mg/m ³
Hydrogen sulphide	5 mg/m ³
Phosphorus and its compounds (as phosphorus)	5 mg/m ³
Lead and its compounds (as lead)	2 mg/m ³
Beryllium and its compounds (as beryllium)	0.002 mg/m ³
Total cadmium and mercury and their compounds (as metals)	0.2 mg/m ³
Total nickel and arsenic and their compounds (as metals)	1 mg/m ³
Total heavy metals (as metals)	5 mg/m ³
Polychlorinated dibenzodioxins and Polychlorinated dibenzofurans (as 2,3,7,8-TCDD equivalent) See Appendix A	0.1 ng/m ³
Organic compounds (as total carbon, excluding particulates)	20 mg/m ³

3.0 CONTROL OF EMISSIONS

3.1 As a general guideline, emission of air pollutants should be minimised and controlled to prevent:

- (a) harm to the environment, adverse effects to human health, or creation of any nuisance situation;
- (b) threatening the attainment or maintenance of the relevant air quality objectives;
- (c) giving rise to an objectionable odour noticeable outside the premises where the process is carried on; and
- (d) imposing undue constraint on the existing and future development or land use.

3.2 To satisfy the emission limits set out in section 2.0 of this note, prevention or reduction of emissions at source is preferred. Where the emission cannot be prevented or reduced at sources to meet these requirements, suitable air pollution control equipment should be provided in order to meet these requirements.

- *Metal Recovery Process*

3.3 Emissions from the equipment for the recovery of metals from scrap materials should be adequately contained and vented to a suitable control equipment where necessary to meet the requirements of section 2.0 of this note.

3.4 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 should be provided to vent the emissions to a suitable control equipment where necessary to meet the requirements of section 2.0 of this note.

3.5 Where the metal recovery works includes incineration of any materials in an incinerator, the minimum temperature of the secondary combustion chamber or zone of the incinerator should not be less than 1000⁰C. In addition, the residence time and the oxygen content of the flue gases in the secondary combustion chamber or zone should not be less than 2 seconds and 6% by volume respectively. It is to ensure complete combustion of waste gases and destruction of dioxins and furans in order to meet the requirements of section 2.0 of this note.

- *Materials Handling*

3.6 As a general guideline, handling and storage of fuel, raw materials, products, wastes or by-products should be carried out in such a manner to prevent the release of:

- (a) visible dust emissions;

(b) emissions of organic vapours; and/or

(c) other noxious or offensive emissions.

- *Dispersion*

3.7 Chimneys include vents, structures and openings of any kind from or through which air pollutants may be emitted. The applicant will need to demonstrate that the proposed chimney will provide sufficient dispersion of air pollutants in determining the adequacy of its height.

3.8 A chimney should be at least 3 metres above the roof of any building to which it attaches, and the roof of any adjacent buildings.

3.9 Releases to air from chimneys should be directed vertically upwards and not restricted or deflected by the use of, for example, plates or caps.

3.10 Chimneys should normally be designed for an efflux velocity of not less than 15 m/s at full load condition.

3.11 For a combustion process, the gas exit temperature from the chimney should not be less than the acid dew point.

4.0 MONITORING REQUIREMENTS

4.1 Parameters and sampling frequency will be determined by the Authority. The aim should be to demonstrate:

(a) the process is properly controlled; and

(b) compliance with the terms and conditions imposed to the licence.

4.2 As a general requirement, indication of the satisfactory of air pollution control equipment should be provided.

4.3 For the incineration process mentioned in section 3.5 above, suitable continuous monitoring and recording devices should be provided to monitor and record continuously the temperature and the concentrations of carbon monoxide and oxygen of the exhaust gases at the outlet of the secondary combustion chamber or zone of the incinerator.

5.0 COMMISSIONING

5.1 Commissioning trials (to be witnessed by the Authority whenever appropriate) should be conducted to demonstrate the performance and capability of the air pollution control measures. A report of the commissioning trial should be submitted to the Authority within 1 month after completion of the trial.

6 OPERATION AND MAINTENANCE

- 6.1 Best practicable means requirements include not only the provision of the appliances, but the proper operation and maintenance of equipment, its supervision when in use, and the training and supervision of qualified staff.
- 6.2 In general, equipment should be repaired as soon as practicable. Specific operation and maintenance requirements may be specified for individual equipment.
- 6.3 Failure of any process or air pollution control equipment that may result in abnormal emission of air pollutants should be reported to the Authority as soon as possible.

APPENDIX A Calculation of Total TCDD-Equivalent Concentrations

- The total TCDD-equivalent concentration is obtained by multiplying the concentrations of individual PCDD and PCDF concentrations by their respective 2,3,7,8-TCDD equivalent toxic factors set out below and summing.

<u>Dioxins and Furans</u>	<u>2,3,7,8-TCDD Equivalent Factor</u>
2,3,7,8-TCDD	1
1,2,3,7,8-PeCDD	0.5
1,2,3,4,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
OCDD	0.001
2,3,7,8-TCDF	0.1
2,3,4,7,8-PeCDF	0.5
1,2,3,7,8-PeCDF	0.05
1,2,3,4,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDF	0.001

