



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

FOR

INCINERATORS

(CREMATORIA)

BPM 12/2

Environmental Protection Department
Air Management Group

August 1998

1.0 INTRODUCTION

- 1.1 This note is issued by the Environmental Protection Department as one of a series to provide guidance for processes specified under Part IV of the Air Pollution Control Ordinance (the Ordinance). It is a guide to the Department's officers in the assessment of an application for a licence under the Ordinance.
- 1.2 It should be understood that this note sets out the basic 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, may depend on all the circumstances of an individual application besides this note.
- 1.3 This note covers specified processes and associated processes in relation to the cremation of human remains, described as "Incinerators" in Schedule 1 to the Ordinance. Incinerators are works in which the installed capacity exceeds 0.5 tonne per hour and which are used for the destruction by burning of wastes or refuse, not being any works described in any other specified process.
- 1.4 The requirements set out in this note should be applicable to all cremation units installed or built after 31 August 1998, and be served as a reference to determine the best practicable means for those units installed or built on or before that date.

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 emission from the cremator during normal operations (including start up and shut down) should not, when compared in the appropriate manner with the Ringelmann Chart or an approved device, appear to be as dark as or darker than Shade 1 on the Ringelmann Chart.
- 2.3 The concentration limits specified below should apply to the emissions from the cremation process. All pollutant concentrations are expressed at reference conditions of 0°C, 101.325 kPa, 11% O₂ and dry conditions.

Particulate matter	100 mg/m ³
Hydrogen chloride (excluding particulate matter)	100 mg/m ³
Carbon monoxide	100 mg/m ³ (60 minute average)
Organic compounds (excluding particulate matter and expressed as total carbon)	20 mg/m ³
Dioxins	1 ng/m ³

3.0 FUEL RESTRICTION

3.1 Unless otherwise agreed by the Authority, fuels to be used should be conventional fuels that comply with the provision of the Air Pollution Control (Fuel Restriction) Regulations in force.

4.0 CONTROL OF AIR POLLUTANT EMISSIONS

4.1 Emission of air pollutants should be minimised to prevent:

- (a) harm to 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.

4.2 To satisfy the emission limits set out in section 2.0 of this note, prevention or reduction of emissions at source is the choice. Where the emission is not able to be prevented or reduced at sources to sufficient extents to meet these requirements, air pollution control equipment should be provided.

- *Design of Cremators*

4.3 All cremators should be designed to ensure complete combustion and should be fitted with a secondary combustion zone. As one of the means of achieving good combustion, all cremators should be designed so that there is adequate secondary air in the primary combustion zone to ensure good turbulence.

4.4 The gases should be held at 850°C for a minimum (at all times) of 2 seconds in the secondary combustion zone. The residence time should be determined by direct measurement of the volume rate of the flue gases throughout the cremation cycle at the cremator exit with appropriate corrections made for changes in temperature and oxygen. The concentration of oxygen at the outlet of the secondary combustion zone should not be less than 6% by volume, if measured on a wet basis, or an average of 6% by volume with a minimum of 3% by volume if measured dry. The term "secondary combustion zone" should be taken to mean that volume where the above conditions are met. Other techniques or cremation conditions may be acceptable if it can be demonstrated that the emission limits set out in section 2.0 of this note can be met.

4.5 Coffins should not be introduced to the cremators unless the secondary combustion zone temperature exceeds 850°C or other minimum temperature accepted by the Authority.

- *Dispersion*

4.6 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.

4.7 The efflux velocity of the exhaust gas stream emitted from a chimney should not be less than 7 m/s at full load condition.

4.8 The temperature of the exhaust gas stream emitted from the chimney should not be less than the acid dew point.

4.9 Chimney flues and ductwork should be cleaned regularly to prevent accumulation of materials.

- *Disposal of Residues*

4.10 The removal of ash and non-combustible residues should be undertaken carefully so as to prevent dust emissions. Cremated remains should be moved and stored in a covered container.

- *Miscellaneous*

4.11 The use of PVC, paints/lacquer finishes and adhesives in coffin construction should be minimized wherever possible.

4.12 Personal mementos containing plastic materials should be avoided as far as possible.

4.13 Plastic and/or metal coffin accessories should be removed as far as practicable before the cremation process takes place.

5.0 MONITORING

5.1 The applicant should satisfy the Authority that -

- (a) he will provide the necessary instrumentation, process controls and monitors to demonstrate that the process is being properly controlled;
- (b) the scope, manner and monitoring frequency will be sufficient to demonstrate compliance with the terms and conditions imposed to the licence at all times; and
- (c) he will have sufficient staff to service these requirements.

Results of all monitoring and inspections should be recorded in such manner specified by the Authority. This record should be retained at the premises for a minimum of two years, or other period specified by the Authority, after the date of last entry and be made available for examination as and when required by the Authority.

- 5.2 Without prejudice to the generality of paragraph 5.1 above, the following process parameters should be continuously monitored by continuous monitoring equipment:
- (a) temperature inside the primary combustion zone;
 - (b) temperature at the outlet from the secondary combustion zone;
 - (c) oxygen concentration at the outlet from the secondary combustion zone;
 - (d) carbon monoxide concentration at the outlet from the secondary combustion zone; and
 - (e) smoke density at the chimney of the cremator.
- 5.3 The continuous monitoring equipment to be provided should meet the specifications specified by the Authority. They should be maintained and calibrated according to the manufacturer's recommendations. Unless otherwise agreed by the Authority, zero and span checks should be carried out every 24 hours.
- 5.4 The instruments for smoke density monitoring should be fitted with audible or visual alarms which should activate at a reference level agreed with the Authority. Emission events which lead to the alarms being activated should be properly recorded in such manner and format agreed with the Authority. These instruments should be checked to ensure that they are functioning correctly in accordance with the manufacturer's instructions.
- 5.5 As and when required, the monitoring data should be transmitted instantaneously to the Authority by telemetry in such manner and format agreed with the Authority.

6.0 COMMISSIONING

- 6.1 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. Unless otherwise agreed by the Authority, the report of the commissioning trial should be submitted to the Authority within 1 month after completion of the trial.

7.0 OPERATION AND MAINTENANCE

- 7.1 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 properly qualified staff.
- 7.2 Equipment should be repaired as soon as possible. Specific operation and maintenance requirements should be specified for individual pieces of equipment used in the specified process.
- 7.3 Malfunction, breakdown or failure of any process or air pollution control equipment that may result in abnormal emission of air pollutants should be reported to the Authority by telephone or facsimile as soon as possible, followed by a written report within 3 working days after the

incident.