



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

**FOR**

**TAR AND BITUMEN WORKS**

**(ASPHALTIC CONCRETE PLANTS)**

**BPM 15 (94)**

Environmental Protection Department  
Air Policy Group

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## **1. INTRODUCTION**

- 1.1 This Note is one of a series issued by the Environmental Protection Department to provide guidance on air pollution management for processes specified under Part IV of the Air Pollution Control Ordinance (the Ordinance). It also serves as a guide for the assessment of an application for Specified Process licence under the Ordinance.
- 1.2 It should be understood that this Note sets out the basic requirements for the applicant to provide and maintain the best practicable means for the prevention of 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 besides the requirements set out in this Note. The Authority may devise specific requirements for individual facility carrying out the specified process.
- 1.3 This Note covers the specified process and associated processes for the below operations under “Tar and Bitumen Works” in Schedule 1 to the Ordinance in which the processing capacity exceeds 250 kg per hour and in which
- (a) gas tar or coal tar or bitumen is distilled or is heated in any manufacturing process; or
  - (b) any product of the distillation of gas tar or coal tar or bitumen is distilled or heated in any process involving the evolution of any noxious or offensive gas.

## **2. EMISSION LIMITS**

- 2.1 All emissions to air, other than steam or water vapour, shall be colourless, free from persistent mist or fume, and free from droplets.
- 2.2 Emissions from the specified process and associated processes as covered by this Note shall not:
- (a) exceed the concentration limits set out in Annex I.
  - (b) appear to be as dark as or darker than Shade 1 on the Ringelmann Chart when compared in the appropriate manner with the Ringelmann Chart or an approved device.

## **3. FUEL RESTRICTION**

- 3.1 All fuels to be used shall comply with the Air Pollution Control (Fuel Restriction) Regulations in force.

## 4. CONTROL OF EMISSIONS

### 4.1 Design of chimney

Chimney includes structures and openings of any kind from or through which air pollutants, generated from combustion, drying and/or other manufacturing process of the plant, may be emitted.

4.2 The design of chimney is to be determined by mathematical or physical dispersion modelling techniques acceptable to the Authority. The aims are to ensure:

- (a) the relevant Air Quality Objectives (AQOs) will not be threatened;
- (b) the emission of non-AQO pollutants, in particular, heavy metals and carcinogenic organic compounds, will not cause any adverse effect to human health or environment;
- (c) no undue constraint will be incurred to existing and future development or land use.

4.3 In any case, the design of chimney shall at least satisfy the following conditions:

#### (a) Chimney height

The final chimney height shall be agreed with the Authority but, as a general guideline, the chimney height in a flat terrain situation should as far as practicable be at least Building Height + 1.5 x Building Width or Building Height, whichever is the lesser. Suitable adjustment should be made to take into account local meteorological data, local topography and background air pollutant concentrations. In any case, the chimney shall not be less than 3 metres plus the building height or 8 metres above ground level, whichever is the greater.

#### (b) Efflux velocity

The efflux velocity of gases from the main chimney (i.e., chimney for the kiln dryer), whenever practicable, should be at least 1.5 times of the wind speed at the chimney top. In any case, it shall not be less than 12 m/s at full load condition.

#### (c) Exit temperature

For combustion process, the flue gases exit temperature shall not be less than the acid dew point.

(d) Mode of discharge

Release to air from chimney shall be directed vertically upwards and not be restricted or deflected by the use of, for example, plates, caps or cowls.

Chimney flues and ductwork leading to the chimney shall, as far as practicable, be adequately insulated with materials not containing asbestos to minimize the cooling of waste gases and to prevent liquid condensation on internal surfaces.

In order to obtain maximum thermal buoyancy, hot emissions shall, as far as practicable, be discharged from the minimum number of chimneys, i.e., a multi-flue chimney design should be used.

4.4 Clean energy sources and fuels with proven benefits to air pollution reduction shall be used whenever possible in the relevant specified process and associated operations. The use of electricity or gaseous fuel for process heating or production of goods is always recommended.

## 5. FUGITIVE EMISSION CONTROL

### 5.1 Boundary Ambient Standards

|                                   |  |
|-----------------------------------|--|
| Total Suspended Particulates      | 260 $\mu\text{g}/\text{m}^3$ (24-hour average) |
| Respirable Suspended Particulates | 180 $\mu\text{g}/\text{m}^3$ (24-hour average) |
| Odour                             | 2 odour units                                  |

*(Note: An odour unit is the measuring unit of odour level and is analogous to pollutant concentration. In this context, the odour level is defined as the ratio of the volume which the sample would occupy when diluted with air to the odour threshold, to the volume of the sample. In other words, one odour unit is the concentration of the odorant which just induces an odour sensation.)*

### 5.2 Engineering Design / Technical Requirements

To be agreed with the Authority. As a general guideline, the loading, unloading, handling and storage of fuel, raw materials, products, wastes or by-products shall be carried out in a manner acceptable to the Authority so as to prevent the release of:

- (a) visible dust emissions; and/or
- (b) emissions of organic vapours; and/or
- (c) other noxious or offensive emissions.

- 5.3 Without prejudice to the generality of the above general requirements, the following control measures shall be implemented:

Cold feed side

- 5.4 The aggregates with a nominal size less than or equal to 5 mm shall be stored in totally enclosed structure such as storage bin and shall not be handled in open area. Where there is sufficient buffer area surrounding the plant, ground stockpiling may be used. The stockpile shall be enclosed at least on top and 3 sides and with flexible curtain to cover the entrance side. If these aggregates are stored above the feeding hopper, they shall be enclosed at least on top and 3 sides and be wetted on the surface to prevent wind-whipping.
- 5.5 The aggregates with a nominal size greater than 5 mm should preferably be stored in totally enclosed structure. Aggregates stockpile that is above the feeding hopper shall be enclosed at least on top and 3 sides. If open stockpiling is used, the stockpiles shall be enclosed on 3 sides with the enclosure wall sufficiently higher than the top of the stockpile to prevent wind whipping.
- 5.6 Belt conveyors shall be enclosed on top and 2 sides and provided with a metal board at the bottom to eliminate any dust emission due to the wind-whipping effect. Other type of enclosure will also be accepted by the Authority if it can be demonstrated that the proposed enclosure can be achieve the same performance.
- 5.7 Scrapers shall be provided at the turning points of all belt conveyors inside the chute of the transfer points to remove dust adhered to the belt surface.
- 5.8 All conveyor transfer points shall be totally enclosed. Openings for the passages of conveyors shall be fitted with adequate flexible seals.
- 5.9 All materials returned from dust collection system shall be transferred in enclosed system and shall be stored inside bins or enclosures.

Hot feed side

- 5.10 The inlet and outlet of the rotary dryer shall be enclosed and ducted to a dust extraction and collection system such as a fabric filter. The particulate and gaseous concentration at the exhaust outlet of the dust collector shall not exceed the limiting values specified in Section 2 of this Note.
- 5.11 The bucket elevator shall be totally enclosed and the air be extracted and ducted to a dust collection system to meet the particulates limiting value specified in Section 2 of this Note.
- 5.12 All vibratory screens shall be totally enclosed and dust tight with close-fitted access inspection opening. Gaskets shall be installed to seal off any cracks and edges of any inspection openings.

- 5.13 Chutes for carrying hot material shall be rigid and preferably fitted with abrasion resistant plate inside. They shall be inspected daily for leakages.
- 5.14 All hot bins shall be totally enclosed and dust tight with close-fitted access inspection opening. Gaskets shall be installed to seal off any cracks and edges of any inspection openings. The air shall be extracted and ducted to a dust collection system to meet the particulates limiting value specified in Section 2 of this Note.
- 5.15 Appropriate control measures shall be adopted in order to meet the bitumen emission limit specified in Section 2 of this Note as well as the ambient odour level stated in paragraph 5.1.

#### Material transportation

- 5.16 The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rocks, sands, stone aggregates, reject fines, shall be carried out in such a manner as to minimize dust emissions.
- 5.17 Roadways from the entrance of the Works to the product loading points and/or any other working areas where there are regular movements of vehicles shall be paved or hard surfaced.
- 5.18 Haul roads inside the Works shall be adequately wetted with water and/or chemical suppressants by water trucks or water sprayers.
- 5.19 Vehicle exhausts, wherever possible, shall be directed upward.
- 5.20 Wheel cleaning facilities shall be provided for vehicles leaving the Works. All vehicles shall use the wheel cleaning facility before leaving the premises to wash off any dust and/or mud deposited on the wheels.
- 5.21 Transportation of finished products shall be carried out with closed tankers or trucks that are fully and tightly covered with tarpaulin sheet before leaving the premises.

#### Control of emissions from bitumen decanting

- 5.22 The heating temperature of the particular bitumen type and grade shall not exceed the corresponding temperature limit of the same type listed in Appendix 1. Tamper-free high temperature cutoff device shall be provided to shut off the fuel supply or electricity in case the upper limit for bitumen temperature is reached.
- 5.23 Proper chimney for the discharge of bitumen fumes shall be provided at high level. The emission of bitumen fumes shall not exceed the emission limit specified in Section 2 of this Note.
- 5.24 The air-to-fuel ratio shall be properly controlled to allow complete combustion of the fuel. The fuel burners, if any, shall be maintained properly and free from carbon deposits in the burner nozzles.

### Liquid fuel

- 5.25 The receipt, handling and storage of liquid fuel shall be carried out so as to prevent the release of emissions of organic vapours and/or other noxious and offensive emissions to the air.

### Housekeeping

- 5.26 A high standard of housekeeping shall be maintained. Waste material, spillage and scattered piles gathered beneath belt conveyors, inside and around enclosures shall be cleared frequently. The minimum clearing frequency is on a weekly basis.

## **6. OPERATION AND MAINTENANCE**

- 6.1 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. Specified operation and maintenance requirements may be specified for individual equipment.
- 6.2 In particular, the dust extraction and collection system shall be routinely inspected and maintained in good condition at all times and shall be used whenever the concerned equipment or emission points are in use. The owner shall conduct inspection of the dust extraction and collection system at least once per month and record on the list of inspection items that are to be agreed with the Authority. The handling and storage of the dust collected by the dust collection system shall be carried out without fugitive particulate emissions.
- 6.3 Malfunctioning or breakdown of equipment leading to abnormal emissions shall be dealt with promptly. In any case, the duration of any abnormal emission due to equipment failure shall not be more than 5 minutes or an aggregate of 30 minutes in any calendar month. These incidents shall be reported to the Authority within 3 working days.

## **7. MONITORING REQUIREMENTS**

- 7.1 Parameters and sampling frequency will be determined by the Authority. In any case, the emissions of particulate matter and bitumen fumes from the main chimney (i.e., the chimney serving the kiln dryer) shall be tested at least annually. In addition, the following parameters shall be monitored continuously as a minimum requirement:

- (a) In-stack monitoring

Particulate matter (opacity) from the combustion process by an opacity meter installed at the main chimney.

(b) Process monitoring

Production rate and other essential operating parameter(s) which may significantly affect the emission of air pollutants.

(c) Ambient monitoring

Monitoring of the 24-hour average concentration of the total suspended and/or respirable suspended particulates in ambient air shall be conducted at the site boundary and/or any other locations to be agreed by the Authority. The sampling shall conform to the United States Environmental Protection Agency's Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-volume Method) and shall be conducted at a frequency of not less than once every 6 calendar days.

## **8. COMMISSIONING**

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

## ANNEX I CONCENTRATION LIMIT FOR EMISSION FROM TAR AND BITUMEN WORKS

- I.1 Air pollutant emissions from the subject specified process and associated processes covered by this Note shall not exceed the concentration limits specified in the table below.

| Air Pollutant | Concentration Limit   |
|---------------|---|
| Bitumen fumes | 5 mg/m <sup>3</sup><br>(not applicable to the vents of bitumen decanters) |
| Particulates  | 50 mg/m <sup>3</sup>  |

- I.2 For combustion gases, the concentration limits are expressed at dry, 0°C temperature, 101.325 kPa pressure and 3% oxygen content conditions.
- I.3 For non-combustion gases, the concentration limits are expressed at 0°C temperature, 101.325 kPa pressure conditions, and without correction for water vapour or oxygen content. The introduction of dilution air to achieve the emission limits is not permitted.

**Appendix 1 MAXIMUM HEATING TEMPERATURE OF DIFFERENT GRADES OF BITUMEN**

| <b>Grade</b>               | <b>Temperature (°C)</b> |
|----------------------------|-------------------------|
| <b>Penetration grades</b>  |                         |
| 450                        | 130                     |
| 300                        | 135                     |
| 200                        | 140                     |
| 100                        | 155                     |
| 70                         | 160                     |
| 50                         | 165                     |
| 35                         | 175                     |
| 25                         | 185                     |
| 15                         | 190                     |
| <b>Hard grades</b>         |                         |
| H80/90                     | 200                     |
| H110/120                   | 230                     |
| <b>Oxidised grades</b>     |                         |
| 75/30                      | 195                     |
| 85/25                      | 210                     |
| 85/40                      | 210                     |
| 95/25                      | 220                     |
| 115/15                     | 230                     |
| <b>BS Cutback grades</b>   |                         |
| 50 secs                    | 105                     |
| 100 secs                   | 110                     |
| 200 secs                   | 120                     |
| <b>ASTM Cutback grades</b> |                         |
| MC. 30                     | 30                      |
| RC.MC.SC. 70               | 45                      |
| RC.MC.SC. 250              | 70                      |
| RC.MC.SC. 800              | 85                      |
| RC.MC.SC. 3000             | 105                     |