



**A GUIDANCE NOTE ON THE
TECHNICAL, MANAGEMENT AND MONITORING
REQUIREMENTS**

FOR

**SPECIFIED PROCESS –
CEMENT WORKS**

(CONCRETE BATCHING PLANT)

BPM 3/2 (16)

Environmental Protection Department

Environmental Compliance Division /
Air Policy Division

February 2016

1. INTRODUCTION

- 1.1 This Note is one of a series issued by the Environmental Protection Department to guide the air pollution management of specified processes (SP), to which Part IV of the Air Pollution Control Ordinance (the Ordinance) applies, and the assessment of an application for an SP licence. It covers operations for the manufacture of ready-mix concrete by batching cement and other materials for cement works, which are described as follows in Schedule 1 to the Ordinance -

“Works in which the total silo capacity exceeds 50 tonnes and in which cement is handled or in which argillaceous and calcareous materials are used in the production of cement clinker, and works in which cement clinker is ground.”

- 1.2 Under section 12 of the Ordinance, the owner of any premises used for the conduct of an SP shall use the **best practicable means** (BPM) for preventing the emission of noxious or offensive emissions from their plants, preventing the discharge of such emissions into the atmosphere and rendering such emissions where discharged harmless and inoffensive. This Note sets out the minimum requirements for the provision and maintenance of the BPM for an individual plant. However, an applicant for an SP licence should recognize that fulfilment of the requirements in this Note does not necessarily lead to the granting of the licence because the decision will also take into account the circumstances of an individual application. In addition, the Authority may impose specific requirements in the licence, if granted, on top of the requirements set out in this Note. The terms and conditions in the SP licence should be the statutory requirements for the environmental management of the SP.

(Note: “best practicable means”, where used with respect to the emission from a premises of an air pollutant, has reference not only to the provision and the efficient maintenance of appliances adequate for preventing such emission, but also to the manner in which such appliances are used and to the proper supervision by the owner of the premises of any operation in which such an air pollutant is evolved.)

- 1.3 If an SP licence holder seeks to renew the licence of his existing SP that fails to meet the latest version of this Note at the time of the licence renewal application, he should provide full justifications for the failure and propose for the Authority’s consideration his plan to upgrade the emission control performance of his plant including the implementation timeframe.

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 non-fugitive fixed emission points in the specified and associated processes as covered by this Note shall not:

- (a) exceed the concentration limit 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 Emission of air pollutants shall be minimized to prevent:

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

4.2 To satisfy the emission limits set out in Section 2 of this Note, prevention or reduction of emissions at source should be made. Where the emission cannot be prevented or reduced at source to a sufficient extent to meet these requirements, air pollution control equipment shall be provided to meet the emissions limits.

4.3 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.

4.4 Wherever possible, the final discharge point from a particulate matter arrestment plant, where it is not necessary to achieve dispersion of the residual pollutants, should be at low level to minimize the effect on the surroundings in case of abnormal emissions and to

facilitate maintenance and inspection.

5. OPERATION AND MAINTENANCE

- 5.1 Requirements include not only the provision of the emission control equipment but also its proper operation and maintenance as well as its supervision when in use and the training and supervision of properly qualified staff. Specific operation and maintenance requirements may be specified for individual equipment.
- 5.2 Malfunctioning and breakdown of the process or air pollution control equipment, which would cause exceedance of the emission limits or breaches of other air pollution control requirements, should be reported to the Authority within 3 working days.

6. FUGITIVE EMISSION CONTROL

Engineering Design/Technical Requirements

- 6.1 The Authority will prescribe the requirements in consideration of the circumstances of an individual SP plant. As a general guidance, the loading, unloading, handling and storage of fuel, raw materials, products, wastes or by-products should be carried out in a manner acceptable to the Authority so as to prevent the release of:
- (a) visible dust emission; and/or
 - (b) other noxious or offensive emissions.
- 6.2 Without prejudice to the generality of the above general requirements, the following control measures shall be implemented:

Cement and other dusty materials

- 6.3 The loading, unloading, handling, transfer or storage of cement, pulverised fuel ash (PFA) and/or other equally dusty materials shall be conducted in a totally enclosed system acceptable to the Authority. All dust-laden air or waste gas generated by the process shall be properly extracted and vented to fabric filtering system to meet the emission limit stipulated in Section 2 of this Note.
- 6.4 Cement, PFA and/or other equally dusty materials shall be stored in storage silos fitted with audible high level alarms to warn of over-filling. The high-level alarm indicators shall be interlocked with the material filling line such that in the event of the silos going to be overfilled, an audible alarm will operate, and after 1 minute or less the material filling

line will be closed to avoid overfilling.

- 6.5 Vents of all silos shall be fitted with fabric filtering system to meet the emission limit stipulated in Section 2 of this Note.
- 6.6 Vents of cement/PFA weighing scale shall be fitted with fabric filtering system to meet the emission limit stipulated in Section 2 of this Note.
- 6.7 Seating of pressure relief valves of all silos shall be checked at least once a week during the process of filling dusty materials into the silos to ensure no dust-laden air leakage from the pressure relief valves.

Other raw materials

- 6.8 The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rock, sand, stone aggregate, shall be carried out in such a manner to prevent or minimize dust emissions.
- 6.9 The materials mentioned in paragraph 6.8 of this Note shall be adequately wetted prior to and during the loading, unloading and handling operations. Effective manual or automatic water spraying system shall be provided and used at all unloading areas, stock piles and material discharge points.
- 6.10 All receiving hoppers for unloading materials mentioned in paragraph 6.8 of this Note shall be enclosed on three sides up to 3 metres above the unloading point. In no case shall these hoppers be used as the material storage devices.
- 6.11 Aggregates with a nominal size less than or equal to 5 millimeters should be stored in totally enclosed structures such as storage bins and should not be handled in open area. Where there is sufficient buffer area surrounding the concrete batching 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.
- 6.12 Aggregates with a nominal size greater than 5 millimeters should preferably be stored in a totally enclosed structure. If open stockpiling is used, the stockpile shall be enclosed on 3 sides with the enclosure wall sufficiently higher than the top of the stockpile to prevent wind whipping.
- 6.13 The opening between the storage bin and weighing scale of the materials mentioned in paragraph 6.8 of this Note shall be fully enclosed.

Conveyor on fixed structure

- 6.14 The belt conveyors for handling materials mentioned in paragraph 6.8 of this Note shall be

enclosed on top and 2 sides with a metal board at the bottom to eliminate any dust emission due to wind-whipping effect. Other type of enclosure will also be accepted by the Authority if it can be demonstrated that the proposed enclosure can achieve same performance.

- 6.15 All conveyor transfer points shall be totally enclosed. Openings on the enclosure for the passage of conveyors shall be fitted with effective flexible seals to prevent dust emission.
- 6.16 Scrapers shall be provided at the turning points of all conveyors to remove dust adhered to the belt surface.
- 6.17 Conveyors discharged to stockpiles of materials mentioned in paragraph 6.8 of this Note shall be arranged to minimize free fall as far as practicable. All free falling transfer points from conveyors to stockpiles shall be fitted with chute(s) or flexible curtain to minimize dust emission due to wind-whipping effect and shall be water sprayed.

Loading of materials for batching and cleaning of mixer trucks

- 6.18 Mixer trucks shall be loaded in such a way to minimise airborne dust emissions. Without prejudice to the generality of this requirement, the following control measures shall be implemented:
 - (a) Pre-mixing the materials in a totally enclosed concrete mixer before loading the materials into the mixer truck is recommended. All dust-laden air generated by the pre-mixing process as well as the loading process shall be totally vented to fabric filtering system to meet the emission limit stipulated in Section 2 of this Note.
 - (b) If truck mixing batching or other types of batching method is used, local dust control measures that are capable of collecting and venting all dust-laden air generated by the material loading/mixing to a dust arrestment plant to meet the emission limit stipulated in Section 2 of this Note shall be provided. When loading dry materials into mixer trucks, a ribbon feed technique coupled with additional dust control measures such as flexible curtain to adequately enclose the space with loading emissions and water spraying shall be used. The effectiveness of the dust control measures shall be demonstrated to the satisfaction of the Authority
 - (c) For loading materials into the mixer drum of mixer trucks, the loading point must be fitted with a flexible sleeve which is long enough to enter the mixer drum hatch of the mixer trucks. The flexible sleeve should be made of material capable of withstanding continuous exposure to concrete ingredients such as cement slurries and abrasive aggregates.

Cleaning of vehicles leaving the premises

- 6.19 All practicable measures shall be taken to prevent or minimize the dust emission caused by vehicle movement.
- 6.20 All access and route roads within the premises shall be paved and adequately wetted.
- 6.21 Vehicle cleaning facilities shall be provided at the site exit of the premises and used to clean leaving vehicles as follows:
- (a) All vehicle cleaning activities shall be carried out within the site boundary. During cleaning, the whole vehicle body shall be located within the site boundary, and there shall be no splashing of wash water to public area outside the site boundary at all times.
 - (b) Effective vehicle cleaning facilities and/or arrangement, such as installation of adequate number of pressurized water spray nozzles, shall be in place and operated to thoroughly wash down muddy materials from the vehicle body and wheels before vehicles leave the site exit. Where necessary, manual hosing by trained labourer shall also be supplemented to ensure thorough removal of dust and no muddy water on the vehicle body and wheels.
 - (c) Effective vehicle stopping device, such as a barrier gate or other effective means agreed by the Authority, and interlocking system shall be installed at the cleaning area at the exit of the cleaning area inside the site boundary to ensure sufficient time for cleaning of the vehicles. Detailed inspection of the vehicles after cleaning shall be conducted to ensure thorough removal of dust and no carrying over of muddy water on the vehicle body and wheels before allowing vehicles to leave the site.
 - (d) A slurry water handling system shall be provided and operated effectively to intercept all wash water from the vehicle cleaning process. There should be a peripheral U-channel or suitable alternative to ensure no discharge or spillage of the wash water beyond the site boundary and to prevent dust deposit accumulation on the public roads.
- 6.22 There shall be no visible run-off of sediment-laden water from the vehicle cleaning facilities to areas outside the premises.
- 6.23 As different arrangements of vehicle cleaning facilities may be used to meet specific site conditions, the applicant seeking a new licence, variation of a licence or renewal of a licence shall provide detailed information on vehicles cleaning facilities for agreement by the Authority.

Mixer Trucks

6.24 Closure device shall be provided on mixer trucks for preventing spillage of concrete from the concrete discharge outlet of mixer trucks.

Housekeeping

6.25 A high standard of housekeeping shall be maintained. All spillages or deposits of materials on ground, support structures or roofs shall be cleaned up promptly by a cleaning method acceptable to the Authority. Any dumping of materials at open area shall be prohibited.

7 MONITORING REQUIREMENTS

7.1 Parameters and sampling frequency will be determined by the Authority. However, the following parameters should be monitored as specified below:

(a) Process Monitoring

Monthly total of raw material input, product output and material stock (by manual recording), and other essential operating parameter(s) which may significantly affect the emission of air pollutants.

(b) Ambient Monitoring

At site boundary and/or any other locations acceptable to the Authority:	Respirable suspended particulates (at least one 24-hour sample per 6 calendar days)
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7.2 The following Boundary Ambient Standards set for triggering investigations by the licence holder

Respirable suspended particulates : 100 µg/m³ (24 hour average)

Event and Action Plan

7.3 Should the boundary ambient standard be exceeded, the licence holder shall take action according to the Event and Action Plan at Annex II.

8 COMMISSIONING

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

**ANNEX I CONCENTRATION LIMIT FOR EMISSION FROM CEMENT WORKS –
CONCRETE BATCHING PLANT**

1.1 With respect to non-fugitive fixed emission points of bag filters, air pollutant emissions from each emission point of the subject specified process shall comply with the concentration limit specified below. The air pollutant concentration is expressed at reference conditions of 0°C temperature, 101.325 kPa pressure, and without correction for water vapour content. Introduction of diluted air to achieve the emission concentration limit shall not be permitted.

Air Pollutant	Concentration Limit
Particulate matter	10 mg/m ³ (design standard) [a]

Note: [a] For the emission points of existing premises with a designed concentration limit of 50 mg/m³, the licence holder shall, upon licence renewal, submit an improvement plan to meet the limit of 10 mg/m³ (design standard). The concentration limit of 10 mg/m³ (design standard) shall be met by 1 January 2018 for all plants.

ANNEX II EVENT AND ACTION PLAN

Event and Action Plan

Parameter	Action level
24 hr average RSP	100 µg/m ³ or below
Plant Environmental Personnel	Licensee
<ol style="list-style-type: none"> 1. Identify the source, investigate the causes and propose remedial measures. (<i>Exceedance of action level may be caused by malfunction of sampler and its operation, high level of background concentration, failure of air pollution control equipment, mishandling of materials, etc.</i>) 2. Discuss with the operator for remedial actions required. 3. Carry out corrective actions. 4. Check the effectiveness of actions. 5. Repeat measurement and increase monitoring frequency if necessary. 	<ol style="list-style-type: none"> 1. Notify the Authority for events with concentration equal or above 100 µg/m³. 2. Rectify any unacceptable practice. 3. Amend working methods if appropriate. 4. Report details of the findings (together with the daily inspection records in the past six days before the event) to the Authority.