

## Guidelines EN-G08: Mineral Works

PCFC- Entity (Business Unit) Name	:	Trakhees – Ports, Customs & Free Zone Corporation
Department Name	:	Environment Health and Safety (EHS)
Section Name	:	Environment Section
Document Reference Number	:	PCFC-TRK-EHS-ENV-G08
Revision Number	:	01
Revision Date	:	June 2023
Classification	:	Public



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## 1. Introduction

- 1.1 These notes apply to works in which minerals, metallurgical slags or pulverized fuel ash are subjected to any size reduction, grading or heating by the processes giving rise to dust or fume, including the subsequent handling of the products of such process. The crushing, screening, drying and coating of materials for use as road stone, etc. fall within this definition, whether fixed or mobile.
- 1.2 The concentration of particulates in emissions to air shall not exceed one hundred fifty (150) mg/m<sup>3</sup>.
- 1.3 Emissions shall be maintained free from visible smoke during the normal operations and substantially free from persistent mist or fume (excluding steam).
- 1.4 The emissions from any chimney or final outlet shall be free from droplets.
- 1.5 Fugitive emissions shall be substantially free from visible emissions of dust.

## 2. Emission and Boundary Ambient Limits

- 2.1 All emissions to air, other than steam or water vapor, shall be colorless and substantially free from persistent mist or smoke. The concentration of total particulate matter in any contained emissions to air, for example the bag filter exhaust air outlet, shall not exceed fifty (50) mg/m<sup>3</sup>. The figure is expressed at a reference condition, 0°C, 101.325 kilopascals, without correction for water vapor and oxygen content. The introduction of dilution air to achieve the emission concentration limits shall not be permitted.
- 2.2 Fugitive emissions including emissions from stockpiles, conveyors and opening of structures shall be minimized as far as practicable. Emissions from these sources shall be substantially free from visible dust emissions.
- 2.3 The 24-hour average of the total particulate concentration in ambient air at the boundary of the plant shall not be more than two hundred sixty (260) µ/m<sup>3</sup> expressed at 25°C temperature and 101.325 kilopascals pressure conditions and that of the respirable suspended particulate concentration not more than one hundred eighty (180) µ/m<sup>3</sup> under the same reference conditions.

### 3. General Operations

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 minimize the release of visible dust emission; and/or other noxious or offensive emissions. The following control measures should be implemented:

a. Arrestment Plant

High efficiency scrubbing or bag filters, or their equivalent are appropriate methods of arrestment capable of meeting the emission limits.

b. Materials Processing, Handling and Storage

In general and where practicable, a policy of dust containment is preferred. In some cases, suppression techniques, where properly designed, used and maintained, can be an effective alternative way and may be the preferred method for some operations.

c. Crushers

Crushing plant shall be fitted, where necessary, with an efficient means for the control of dust emission, including the tipping of raw materials into the hopper and the separation of oversize. It may be necessary to require such dusty operations to be carried out in an enclosed structure ventilated to a filter, or to have an equally effective alternative system.

- The outlet of all primary crushers, and both inlet and outlet of all secondary and tertiary crushers, if not installed inside a reasonably dust tight housing, shall be enclosed and ducted to a dust extraction and collection system such as a fabric filter. The particulate concentration at the exhaust outlet of the dust collector shall not exceed the limiting value mentioned above.
- The inlet hopper of the primary crushers shall be enclosed on top and 3 sides to contain the emissions during dumping of rocks from trucks. The rock while still on the trucks should be wetted before dumping.
- Water sprayers shall be installed and operated in strategic locations at the feeding inlet of crushers.



- Crusher enclosures shall be rigid and fitted with self-closing doors and close-fitting entrances and exits. Where conveyors pass through the crusher enclosures, flexible covers should be installed at entries and exits of the conveyors to the enclosure.

#### d. Conveyors

- Except for those conveyors which are placed within a totally enclosed structure such a screen house or those erected at the ground level, all conveyors shall be totally enclosed with windshield on top and 2 sides.
- Effective belt scraper such as the pre-cleaner blades made by hard wearing materials and provided with pneumatic tensioner, or equivalent device, shall be installed at the head pulley of designated conveyor as required to dislodge fine dust particles that may adhere to the belt surface and to reduce carry-back of fine materials on the return belt. Bottom plates should also be provided for the conveyor unless it has been demonstrated that the corresponding belt scraper is effective and well maintained to prevent falling material from the return belt.
- Except for those transfer points which are placed within a totally enclosed structure such as screen house, all transfer points to and from conveyors shall be enclosed. Where containment of dust within the enclosure is not successful, then water sprayers should be provided. Openings for any enclosed structure for the passage of conveyors should be fitted with flexible seals.

#### e. Surge Piles and Storage

- Open surge piles following primary and secondary crushing and screening shall be kept to a minimum and the height of free fall of stone similarly minimized, incorporating dust suppression treatment.
- Loading to and from stockpile shall be carried out but methods which minimize dust emission and the stockpile should be wetted before being distributed.
- Storage silos for fine materials shall be enclosed and vented to air through filters.

#### f. Transport / Loading



- Tankers carrying dusty non-waste material shall discharge only into vessels fitted with an effective dust collecting system.
- Road transport of dusty materials shall be carried out in closed tankers or sheeted vehicles.
- Loading of road vehicles or ships shall be carried out in a manner to minimize airborne dust.
- Waste dust shall be transported, disposed, of or stored in a manner which prevents the emission of dust.
- Roadways for the transportation of final products off-site leading from the entrance of the works shall be paved or hard surfaced for an agreed distance.
- Active haul road inside the works shall be adequately wetted with water.
- Exhaust of trucks for transportation or rock materials within the site, wherever practicable, shall be directed upward.
- Wheel cleaning facilities shall be provided for delivery trucks leaving the works for the removal of dirt or mud.
- The handling and storage of dust collected by the dust collection system shall be carried out without fugitive particulate emissions.

g. Vibratory Screens and Grizzlies

All vibratory screens shall be totally enclosed in housing. Screen houses shall be rigid and reasonably dust tight with self-closing doors or close-fitted entrances and exits for access. Where conveyors pass through the screen house, flexible covers should be installed at entries and exits of the conveyors to the housing. Where containment of dust within the screen house structure is not successful then a dust extraction and collection system should be provided. The particulate concentration at the exhaust outlet of the dust collector shall not exceed the limiting value mentioned above.

All grizzlies shall be enclosed on top and 3 sides and sufficient water sprayers shall be installed at their feeding and outlet areas.



#### h. Storage Piles and Bins

- Where practicable, free falling transfer points from conveyors to stockpiles shall be fitted with flexible curtains or be enclosed with chutes designed to minimize the drop height. Water sprays should also be used where required.
- The surface of all surge piles and stockpiles of blasted rocks or aggregates shall be kept sufficiently wet by water spraying wherever practicable.
- All open stockpiles for aggregates of size in excess of five (5) mm shall be kept sufficiently wet by water spraying where practicable.
- The stockpiles of aggregates five (5) mm in size or less shall be enclosed on 3 sides or suitably located to minimize wind-whipping. Save for fluctuations in stock or production, the average stockpile should stay within the enclosure walls and in no case the height of the stockpile should exceed twice the height of the enclosure walls.
- Scattered piled gathered beneath belt conveyors, inside and around enclosures shall be cleared regularly.

## 4. Chimney Heights

Chimney heights for road stone plant shall be determined by the Authority after consideration of all the relevant information on throughput, type of material, type and rate of fuel usage, etc.

## 5. General

Chemical suppressants or wetting agents may be added in the water used in the spraying systems.

All spraying systems used for dust suppression shall be maintained in good condition and shall be used as required. The flow rate and operating pressure of the spraying liquid/solution shall be sufficient to suppress dust emissions from the corresponding sources. The spraying system shall be able to cover the areas of emission points concerned.

The dust extraction and collection system shall be routinely inspected and maintained in good condition and shall be used as required.

The owner shall conduct an inspection of the dust extraction and control system at least once per month on the inspection items to be agreed by the Authority.

A high standard of housekeeping shall be maintained. Any piles of materials accumulated on or around the relevant plant shall be cleaned up regularly.

Malfunctioning or breakdown of equipment leading to abnormal emissions shall be dealt with promptly. In any case, the abnormal emission due to equipment failure shall be stopped as soon as practicable.

## 6. Sampling, Monitoring, Reporting and Record Keeping

To ensure that licensed works is capable of meeting the required limits; emission testing and inspections will be conducted. The frequency and time of sampling which will depend upon local circumstances and the potential air pollution impact of the works are to be agreed by the Authority.

Monitoring of the 24-hour average concentration of the total suspended particulate and/or respirable suspended particulate 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.

A written summary of the results of the analysis of the ambient particulate concentration at the site boundary and/or any other locations agreed by the Authority on a monthly basis.

Total monthly 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 shall be recorded and submitted to the Authority, wherever necessary.





Malfunctioning and breakdown of the process or air pollution control equipment which would cause exceedance of the emission limits or breached of other air pollution control requirements should be reported to the Authority within three (3) working days.

A high standard of housekeeping shall be maintained and all roadways and working areas in regular use shall be hard surfaced and kept clean.